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Alaska Pulp Corporation Long-Term Timber Sale Contract

Southeast Chichagof Project Area Final Environmental Impact Statement

Volume I

Southeast Chichagof Project Area
Final Environmental Impact Statement

Alaska Pulp Corporation Long-Term Timber Sale Contract

Chatham Area—Tongass National Forest
U.S.D.A. Forest Service
Alaska

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Abstract

The U.S. Forest Service proposes seven alternatives for making timber volume available to the Alaska Pulp Corporation Long-term Timber Sale Contract: (A1) No-Action—current direction; (A2) No-Action—no further harvest; (B) to focus activities away from recent timber harvest areas; (C) to focus activities in areas of previous harvest; (D) to disperse activities; (E) to concentrate activities in higher elevations and upper valleys; and (F) to concentrate activities away from primary recreation and subsistence use areas.

Abstract

In compliance with Federal and State regulations, the U.S. Forest Service has prepared this Environmental Impact Statement (EIS) analyzing the effects of making timber available from the Southeast Chichagof Project Area to the Alaska Pulp Corporation (APC) under its Long-term Timber Sale Contract Number 12-11-010-1545. The actions analyzed in this EIS are designed to implement direction contained in the Tongass Land Management Plan and the Tongass Timber Reform Act. The environmental effects considered in this analysis include the effects of timber harvest and road construction on other resources. It also includes the effects on timber production of meeting management objectives for nontimber resources including fisheries, wildlife, subsistence, recreation, culture, hydrology, soils, and visual quality.

The original contract between the Forest Service and the APC provided for sale of timber over a 50-year period between 1961 and 2011. Under changes in response to mandated court decisions in the 1980s and the Tongass Timber Reform Act in 1990, timber is to be made available for harvest from smaller, contiguous areas as "timber offerings." The Southeast Chichagof Project Area might be divided into two to six of these offering areas.

Seven alternatives for providing APC with timber under the contract requirements are provided. Alternative A1, one of two no-action alternatives, would permit only previously approved harvest. Alternative A2 represents the no-action alternative required by NEPA and assumes no additional timber would be harvested. Alternative B would concentrate timber harvest away from areas recently harvested. It would harvest 137.4 million board feet (MMBF) of timber and provide for construction of 67 miles of new road and reconstruction of 14 miles of existing road. Alternative C would seek to maintain natural ecosystem connectivity, focus timber harvest as much as possible in watersheds previously harvested, and would require 26 miles of new road and 23 miles of reconstructed road to harvest approximately 111.0 MMBF of timber. Alternative D would disperse new timber harvest and would require 61 miles of new road and 24 miles of reconstructed road to harvest approximately 132.0 MMBF of timber. Alternative E would concentrate activities in higher elevations and upper valleys. Timber harvest would amount to approximately 125.6 MMBF of timber, with 54 miles of new road construction and 15 miles of road reconstruction. Alternative F would focus actions away from primary recreation and subsistence use areas around lakes and along salt water. This would require 37 miles of new road and 22 miles of reconstructed road to harvest approximately 104.5 MMBF of timber.

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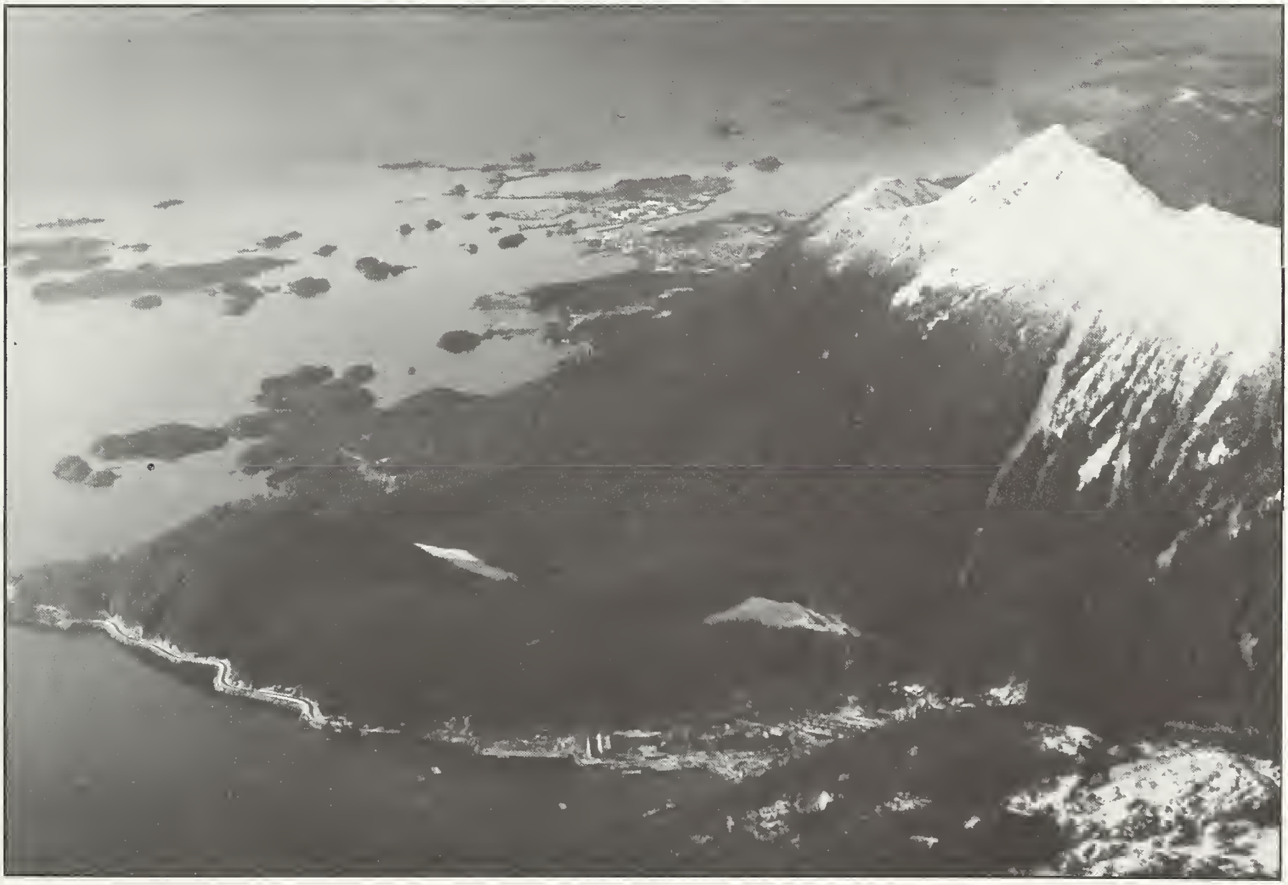
Chapter 1

Purpose and Need



Chapter 1

Purpose and Need

Introduction

In compliance with Federal regulations, the U.S. Department of Agriculture Forest Service has prepared an Environmental Impact Statement (EIS) for the Southeast Chichagof Project Area (also known as Project Area). This EIS is divided into four chapters (as detailed in Figure 1-1), with supporting material included in Appendices A through H.

Chapter 1 of the EIS, Purpose and Need, presents the following:

- Project Overview
- How this project relates to the Tongass Land Management Plan (TLMP)
- How the Southeast Chichagof Project Area was selected
- Issues
- Permits and licenses
- Legislation related to this EIS

Project Overview

Project Purpose

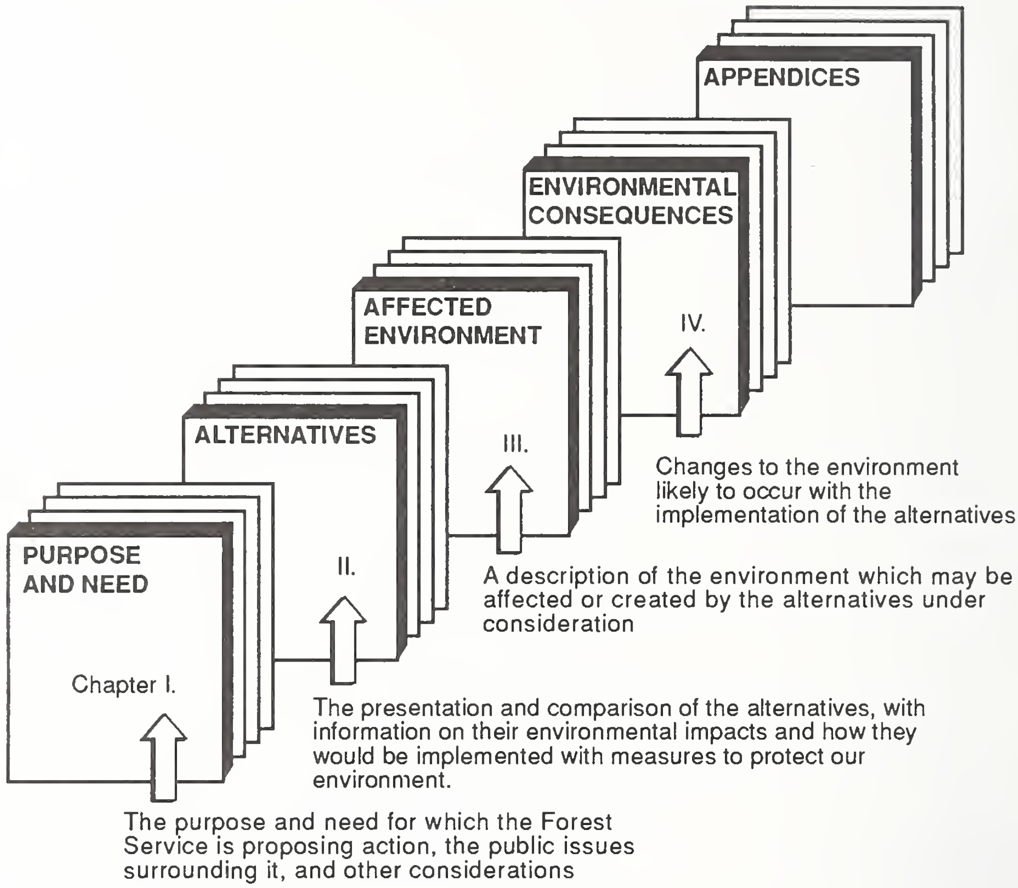
In 1956, the Forest Service and Alaska Lumber and Pulp, now Alaska Pulp Corporation (APC), entered into a timber sale contract for a 50-year period between 1961 and 2011. The purpose and need of the Southeast Chichagof Project is to make timber available in compliance with that contract—APC Long-term Timber Sale Contract Number 12-11-010-1545 (Forest Service 1956).

The actions analyzed in this EIS are designed to implement direction contained in the TLMP, as amended, the Alaska Regional Guide, and applicable Forest Service manuals and handbooks. In accordance with these directives as well as the National Environmental Policy Act (NEPA), the Forest Service planning team used a systematic interdisciplinary process in developing a range of alternatives for timber harvest in the Southeast Chichagof Project Area. This is the second of a series of timber harvest projects which are designed to be consistent with the Tongass Timber Reform Act (TTRA) and which are currently being considered within the APC contract boundary on the Chatham Area of the Tongass National Forest (Figure 1-2). The first project was the Kelp Bay Project.

The environmental effects to be considered during this analysis include the effects of timber harvest and road construction on timber and nontimber resources. The nontimber resources include fish, wildlife, subsistence, recreation, cultural, water, soils, lands, and visual quality.

During the planning process, associated opportunities for the enhancement of fish and wildlife habitat, silviculture prescriptions, soil stability, and recreational opportunities were identified.

Figure 1-1
How This EIS is Organized



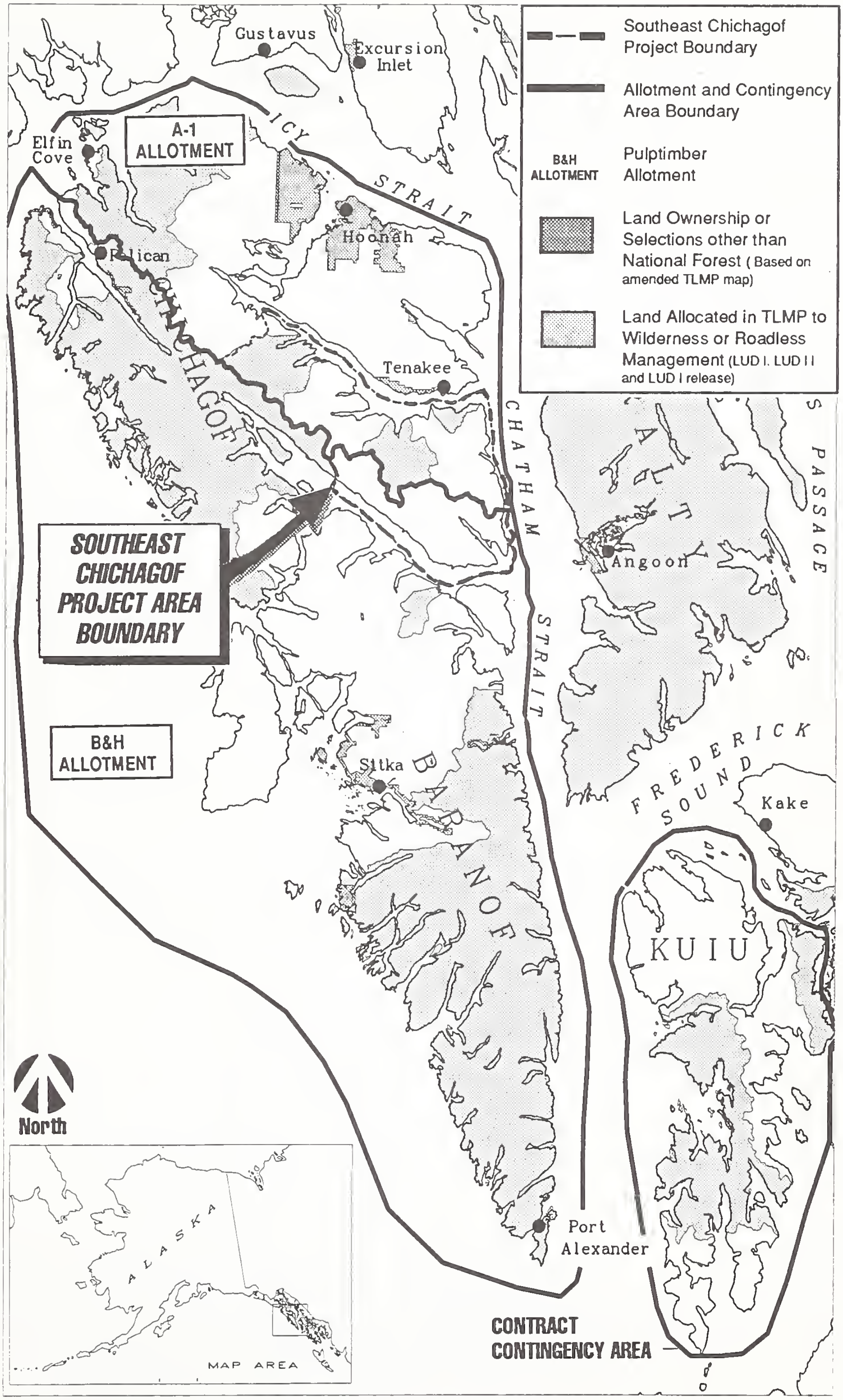
These are listed with each alternative description in Chapter 2. While these opportunities will be identified as part of the Southeast Chichagof Project, scheduling of any activities which take advantage of these opportunities will be left for future evaluation (Morrison 1990).

Decisions to be Made

Based on the environmental analysis, the responsible official (Michael A. Barton, Regional Forester, Forest Service, Alaska Region) will decide whether and how to make timber available from the Southeast Chichagof Project Area to meet contractual timber commitments. His decisions will include:

- The volume to make available under the contract in this Project Area in one or more "timber offerings"
- The location and design of timber harvest units
- The location and design of road systems
- The location and design of log transfer facilities
- Necessary standards and guidelines, mitigation measures, monitoring measures, and enhancement opportunities for resources other than timber
- If there is a restriction, and if so, the significance of that restriction on subsistence use

Figure 1-2
Vicinity/Contract Area Map



1 Purpose and Need

Project Location

The Project Area is located at the southeast end of Chichagof Island and includes the watersheds of Sitkoh Bay, False Island, Basket Bay, Corner Bay, Kadashan Bay, Trap Bay, Crab Bay, Saltery Bay, Inbetween, Seal Bay, Long Bay, Little Basket Bay, White Rock, Sitkoh Lake, Broad Island, and Fog Creek. It is bordered on the north by Tenakee Inlet, on the east by Chatham Strait, and on the south by Peril Strait (Figure 1-2, Vicinity/Contract Area Map).

Tables 1-1 and 1-2 provide a description of the Project Area by TLMP Management Area (MA), legal description, U.S. Geological Survey quadrangle maps, and Value Comparison Unit (VCU). Value comparison units are those areas which generally encompass a drainage and were established in the Tongass National Forest to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Table 1-1
Project Area

Management Area	VCU Included	USGS Quads
C29	227	SD5 NW; SD6 NE
C33	228, 229	SD5 NW, SW, SE; SD6 NE, SE, SW
C34	230-234, 246	SC4 NW, SW SC5 NE, NW, SE; SD5 SE, SW
C36	235	SC4-All; SC4 NE
C37	236, 238-245	SB3 NW; SB4 NE; SC3 NW, SW SC4-All
C37a	237	SC3 NW; SC4 NE; SD3 SW; SD4, SE

Table 1-2
Project Area Legal Description (28 Townships, all Copper River Merridian)

T45S, R60E
T46S, R59E; T46S, R60E; T46S, R61E
T47S, R59E; T47S, R60E; T47S, R61E; T47S, R62E; T47S, R64E; T47S, R65E
T48S, R60E; T48S, R61E; T48S, R62E; T48S, R63E; T48S, R64E; T48S, R65E
T49S, R62E; T49S, R63E; T49S, R64E; T49S, R65E; T49S, R66E
T50S, R63E; T50S, R64E; T50S, R65E; T50S, R66E
T51S, R64E; T51S, R65E; T51S, R66E

Background

The 50-year contract entered into in 1956 between APC and the Federal Government (prescribing terms for sale and logging of timber in Southeast Alaska) provided for harvesting 4,974,700,000 board feet of timber within the sale or contract area—the contract area being comprised of parts of Baranof, Chichagof, Kuiu, and associated islands (Figure 1-2) (Forest Service 1956). This contract is one of two long-term sale contracts on the Tongass National Forest. The second contract is with Ketchikan Pulp Company.

Since the enactment of NEPA in 1969, the Forest Service has prepared EISs for 5-year operating periods for the APC contract area. The EIS for each 5-year period evaluated the proposed actions and potential effects of those actions on the environment. Each EIS resulted in a decision to authorize timber harvest, road construction, and related activities within the APC contract area. EISs have been prepared for the following 5-year periods: 1976 to 1981, 1981 to 86, 1986 to 90, and a supplemental EIS for the combined 1981 to 86 and 1986 to 90 operating periods.

The Alaska Native Claims Settlement Act (ANCSA), Pub. L. 92-203, 85 Stat. 688 (as amended), was approved December 18, 1971 to provide for the settlement of certain land claims of Alaska Natives. ANCSA has been the basis for conveying selected lands under administrative jurisdiction of the Tongass National Forest to Native corporations. Under this Act, Native corporations have selected more than 550,000 acres from the Tongass National Forest, and more than 515,000 acres of the land has been conveyed to them. The withdrawn and yet unconveyed lands remain in a state of suspension, unavailable for Native corporation management.

On December 2, 1980, the Alaska National Interest Lands Conservation Act (ANILCA), Pub. L. 96-487, 94 Stat. 2371 (as amended), was enacted to provide for the designation and conservation of certain public lands in the State of Alaska. This Act established a number of areas to be preserved for the benefit, use, education, and inspiration of present and future generations. Title VII of ANILCA designated 2,592,600 acres or about 32 percent of the Chatham Area as wilderness. Another 17,200 acres became nonwilderness National Monument. Title VIII of the Act addresses the use of public lands for subsistence uses—the customary and traditional uses by rural Alaska residents of wild, renewable resources. In addition, Section 705(a) of the Act provided funding to maintain a timber supply, from the Tongass National Forest, of 4.5 billion board feet per decade.

During the 1980s, a series of court challenges interrupted implementation of the 1981 to 1986 and 1986 to 1990 APC long-term timber sale EISs. During this time, controversy over management of the Tongass National Forest also became a national issue.

On November 28, 1990, President Bush signed into law the TTRA Pub. L. No. 101-626. 104 Stat. 4426. Among other provisions, Section 301 of this Act imposes unilateral changes to the long-term timber sale contract with APC in order to make it more consistent with independent National Forest timber sale programs. Changes provided in the TTRA are as follows:

1) assure that all timber sale planning, management requirements, and environmental assessment procedures regarding the contracts are consistent with procedures for independent national forest timber sales, pursuant to the National Forest Management Act of 1976 (PUB. L. 94-588), the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), and other applicable laws;

2) eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in volume classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area;

3) assure that all timber offered under each contract be substantially harvested within three years or the Secretary [of Agriculture] shall withhold further offerings pursuant to such contract, unless harvesting has been delayed by third-party litigation;

4) assure that the Secretary determines the location and size of sale units and the timing of timber harvests;

5) allow rejection of timber offered under the contracts. Upon rejection of any timber offered, the Secretary may re-offer such timber to any qualified bidder under independent national forest timber sales. If the rejected timber is subsequently sold within 12 months, that amount of timber shall be subtracted from the volume remaining under the appropriate contract;

6) assure that utility logs offered under the contracts shall be counted against contract volume requirements. As used in this paragraph, the term "utility log" means the same as it does in the official Log Scaling and Grading Rules, Northwest Log Rules Advisory Group, January 1, 1982;

7) assure that purchaser road credits are provided under the contracts in a manner consistent with independent national forest timber sale procedures;

8) assure that the price of timber offered under the contracts shall be adjusted to be comparable with that of independent national forest timber sales, with stumpage rates and profitability criteria comparable to those of independent purchasers in competitive sales;

9) assure that timber offered under the contracts meets economic criteria consistent with that of independent national forest timber sales (PUB. L. 101-626).

Furthermore, Section 103 of the TTRA requires the maintenance of "a buffer zone of no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into a Class I stream . . . ." Class I streams provide habitat to anadromous fish and Class II streams provide habitat for resident fish. Commercial timber harvesting shall be prohibited within these buffers. In addition, Best Management Practices (BMPs), as defined in the Region 10 Soil and Water Conservation Handbook (USDA FSH 2509.22), will be used to provide protection of riparian habitat and streams (PUB. L. 101-626).

Prior to the passage of TTRA, a single EIS was prepared for the entire APC contract area for each 5–year operating period. Now, as a result of the direction to make the long–term timber sale contracts more consistent with the independent timber sale program, EISs are prepared for smaller project areas. The Southeast Chichagof Project Area was delineated with regard to these changes in direction. The timber that is made available as a result of this planning process will be in one or more offering areas. Management requirements and the NEPA planning process will be consistent with that for the independent timber sale program.

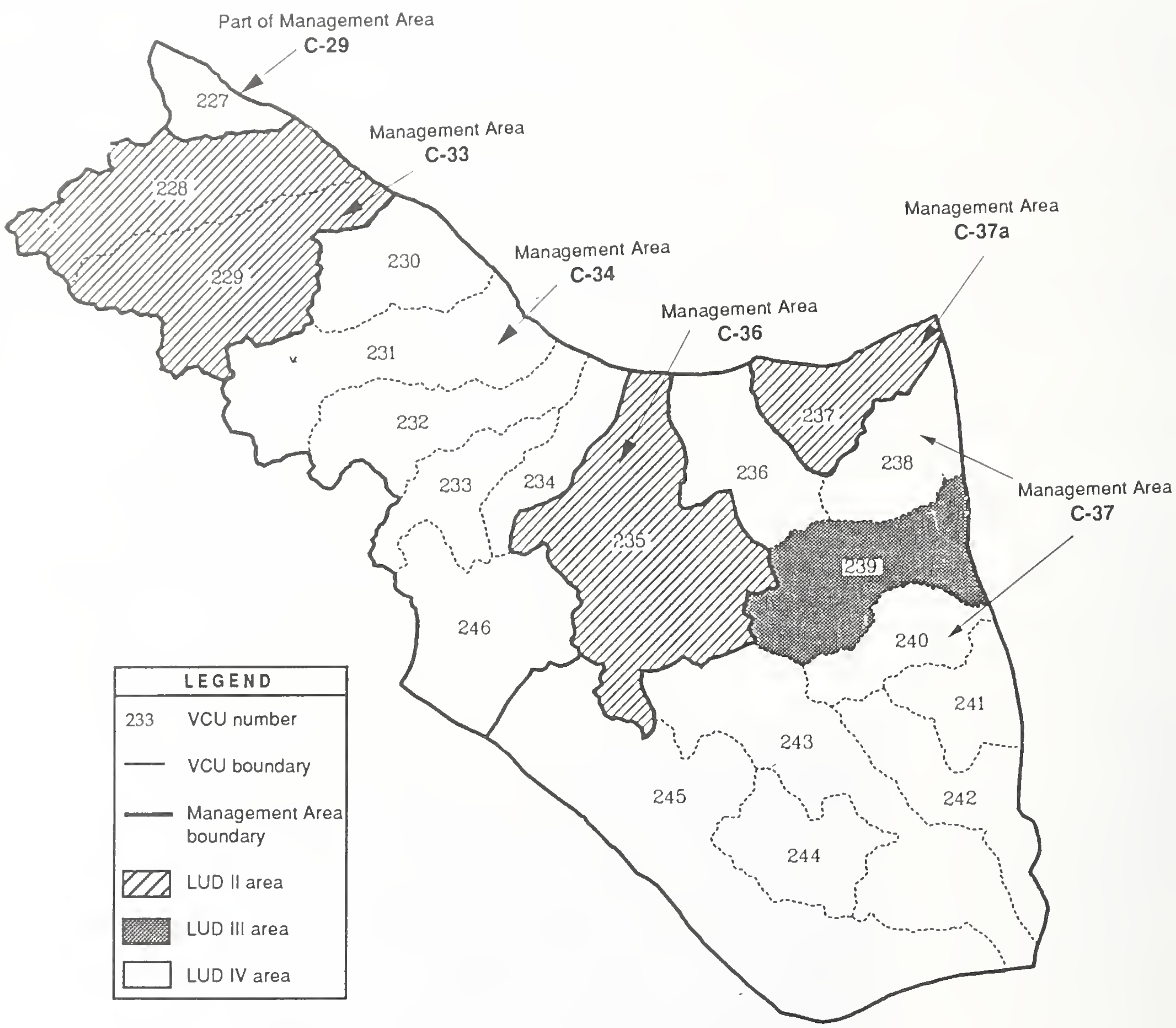
How This Project Relates to the Tongass Land Management Plan (TLMP)

The Southeast Chichagof Project would implement decisions which are consistent with both the management direction of the current TLMP (completed in 1979, amended in the winter 1985/1986, and again in February 1991 as a result of the TTRA) and the recent Supplement to the Draft EIS for the TLMP Revision. The current TLMP provides land and resource management direction for the Tongass National Forest. It established Land Use Designations (LUDs) to guide management of the land for certain uses. The LUDs were assigned to areas known as Value Comparison Units (VCUs). The boundaries of a VCU usually follow easily recognizable watershed divides. MAs were then formed of one or more contiguous VCUs and allocated to LUDs I and II or a combination of LUDs III and IV. Anticipated management activities were then scheduled for each MA. Figure 1-3 displays the MAs, the VCUs, and the LUDs for the Project Area (Forest Service 1979c). This document tiers to the environmental impact statements for both the Alaska Regional Guide (Forest Service 1983) and the current Tongass Land Management Plan (Forest Service 1979a). In addition, the information from the following documents is hereby incorporated by reference (40 CFR 1502.20):

1) Kelp Bay Environmental Impact Statement, February 1992 (Forest Service 1992)
2) 1981-86 and 1986-90 SEIS, November 1989 (Forest Service 1989b)
3) Todd Blowdown Environmental Assessment, August 1989 (Forest Service 1989c)
4) 1986-90 Environmental Impact Statement, November 1986 (Forest Service 1986c)
5) 1981-86 Environmental Impact Statement, April 1980 (Forest Service 1980)
6) Corner Bay Salvage Environmental Assessment, June 1982 (Forest Service 1984)
7) 1976-81 Environmental Impact Statement, February 1976 (Forest Service 1976)
8) Tongass Land Management Plan Revision: Supplement to the Draft Environmental Impact Statement (Forest Service 1991b)
9) Administrative Planning Record Documents (see *Literature Cited* section)

Class I streams provide habitat to anadromous fish

Figure 1-3
Map of VCUs



Land Use Designations (LUDs)

The three LUDs which apply to the Southeast Chichagof Project Area are summarized below (Forest Service 1986b). The timber harvest, road construction, and related activities proposed for the Project Area are consistent with the LUD assigned to each VCU.

LUD II

Areas allocated to LUD II are to be managed in a roadless state to retain their wildland character but would permit wildlife and fish habitat improvement and primitive recreational facility development. VCUs 228, 229, 235, and 237 are currently classified as LUD IIs. According to TLMP 85-86 Amendment, specific management criteria include:

- Personal use of wood is allowed for cabin logs, firewood, float logs, trolling poles, and other similar uses.

- Water and power developments are permitted if they can be designed to retain the overall primitive characteristics of the allocated area.

- Roads will not be built except to serve authorized activities such as mining, power and water development, aquaculture developments, transportation needs determined by the State of Alaska, and vital forest transportation system linkages.

LUD III

Areas allocated to LUD III are to be managed for a variety of uses. The emphasis is on managing for both amenity- and commodity-oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives. VCU 239 is the only area classified as LUD III within this Project Area. Specific authorized activities include:

- Potential timber yields will be reduced to the extent needed to protect important biological and aesthetic values.
- Both permanent and temporary roads are allowed.
- Roads are located and designed to retain important recreational and scenic qualities.
- Mineral development is subject to existing laws and regulations.
- Needed trails can be provided.
- A full range of recreational facilities is permissible.
- A full range of fisheries improvement projects is permitted.

LUD IV

Areas allocated to LUD IV provide opportunities for intensive development of resources. Emphasis is primarily on commodity or market resources and their uses. Amenity values are also provided for. When conflicts over competing resource uses arise, those conflicts most often would be resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity. VCUs 227, 230-234, 236, 238, and 240-246 are classified as LUD IV within this Project Area. Specific authorized activities include:

- Timber is to be harvested primarily by clearcutting.
- Potential timber yields are to be reduced only to the extent necessary to protect the biological and aesthetic values.

- Mineral development is subject to existing laws and regulations. Permanent or temporary roads may be built.
- Motorized use is permitted.
- A full range of recreational facilities is permitted.
- A full range of fisheries improvement projects is permitted.
- Needed trails can be provided.

Management Areas

The TLMP, as amended in 1985-86, provides management direction and schedules activities for the MAs comprising the Southeast Chichagof Project Area. It accomplishes this task, in part, by scheduling activities for two time periods. The first time period encompassed the remainder of the expected life of the TLMP (1985 to 1989). The second time period included the beginning part (i.e., 1990 to 1994) of a "future" planning period spanning 30 years (Forest Service 1986a). The management direction emphasis specified in the TLMP for the MAs comprising the Southeast Chichagof Project Area are summarized below.

Management Area C-29, Tenakee Inlet (LUD IV)

Management Emphasis: Reforestation activities are planned in VCU 222, and timber stand improvement activities are planned in VCU 223. The canoe portage between Port Frederick and Tenakee Inlet could possibly be tied into the trail loop system or used as part of a kayak link between Hoonah and Tenakee Springs. Scheduled activities include reforestation and timber stand improvement. Beach log salvage operations may take place in VCUs 222 through 226 in both time periods. VCU 227 is the only VCU in the Southeast Chichagof Project Area and it is LUD IV.

Management Area C-33, Long Bay (LUD II)

Management Emphasis: Management emphasis for this area will continue to be dispersed recreation. The potential placement of a recreation cabin will be studied this period for possible implementation in the future. Beach log salvage operations may take place in VCUs 228 and 229 in both time periods.

Management Area C-34, Crab Bay (LUD IV)

Management Emphasis: The APC 1981 to 1986 operating period harvest in the Inbetween Creek and Finger Creek sale areas were carried over into the 1986–90 operating period. The Forest Service administrative cabin in Crab Bay will be placed on the recreation cabin system. Beach log salvage operations may take place in all VCUs in both time periods. Scheduled activities include reforestation in VCU 230, timber stand improvement in VCU 233 and 234, and timber sale preparation in VCUs 231, 232, 234, and 246 for the 1990 to 1994 time period.

Management Area C-36, Kadashan (Legislated LUD II)

Management Emphasis: The Kadashan administrative cabin and the Alaska Department of Fish and Game (ADF&G) and Forestry Science Lab (FSL) cabins will remain and be used. Research in brown bear habitat and salmon rearing will continue. Opportunities to manage road use for protection of the brown bear population will be investigated. Beach log salvage operations may take place in VCU 235 in both time periods. TTRA designated this VCU a LUD II.

Aerial view of Kadashan

Management Area C-37, Corner Bay (LUD III and LUD IV)

Management Emphasis: Forest Service administrative sites and industrial camp sites will be maintained at Corner Bay and False Island. Fish and wildlife enhancement projects are scheduled. Recreational opportunities at Sitkoh and Kook lakes will be emphasized; a trail has been constructed to connect Kook Lake with Road No. 7540. Beach log salvage operations may take place in all VCUs in both time periods. Scheduled activities include timber stand improvement in VCU 236 and VCU 245 (past timber sale); stream habitat improvement in VCU 236 (Corner Creek Fish Ladder Maintenance); and timber sale preparation in VCU 236, 239, 240, and 241 during the 1990 to 1994 time period.

Management Area C-37a, Trap Bay (LUD II)

Management Emphasis: Continue to permit research cabins for ADF&G, FSL, and National Marine Fisheries Service (NMFS) in VCU 237. Beach log salvage operations may take place in both time periods. This is a new MA that was designated as a result of TTRA and was documented in the 1991 amendment to TLMP.

How the Southeast Chichagof Project Area was Selected

The *Background* section of this chapter explains how modifications to the APC long-term contract have resulted in smaller areas for environmental analysis. Enactment of the TTRA requires the Forest Service to ensure that all timber sale planning and environmental assessment procedures regarding contracts are consistent with procedures for independent National Forest timber sales (Pub. L.101-626).

As part of the TLMP implementation process and prior to selecting the Southeast Chichagof Project Area, all lands within the APC contract area were analyzed and divided into approximately 50 small geographical areas. Each of these small geographical areas represented a watershed or other area having commercial timber tributary to an existing or future log transfer facility (LTF). The 50 small geographical areas were then grouped into approximately 18 potential project areas for which timber harvest activities could be proposed and environmental analysis completed. The potential project areas were identified based on common geographic features, past harvesting activity, pending legislative action, and estimated available volumes of timber. Appendix A provides the background and rationale for this process.

Length of Time Since Past Harvesting Occurred

Timber harvesting under the APC contract in the Southeast Chichagof Project Area first occurred in the 1950s with major harvest occurring between 1970 and 1978. Additional harvesting occurred between 1985 and 1990. The time span since harvest ranges from 1 to 30 years. Second growth on many previously harvested units ranges from 5 to 50 feet tall. This regeneration adequately meets regional standards for created openings so that mature timber may be harvested adjacent to young stands. Based on the time since the last harvest and the Project Area's current silvicultural condition, another harvest can be scheduled.

Consideration of Potential Effects on Subsistence Users

With the enactment of ANILCA, Congress recognized the importance of subsistence resources to the rural residents of Alaska and acknowledged the fact that the act of gathering subsistence resources in Southeast Alaska is fundamental to the customary and traditional lifestyles of many people. The Southeast Chichagof Project Area provides some subsistence resources for individuals from many areas of Southeast Alaska. However, in considering communities that may be most affected by any proposed timber harvest in the Project Area, five communities stand out. Tenakee Springs, Angoon, Sitka, Haines, and Skagway appear to have the strongest subsistence ties to the Project Area. Each community has its own level of reliance on subsistence as well as its own level of reliance on the Project Area for supplying subsistence resources. The potential effect of timber harvest, road construction, and related activities on the subsistence resources and on subsistence users is an important consideration in the analysis included in this EIS.

Issues

The Forest Service planning process requires early and extensive involvement of the public. On May 2, 1990, the Notice of Intent was published in the Federal Register. On May 11, a public scoping document was mailed to 420 individuals; 5 organizations; and 15 municipal, State, and Federal agencies. A second mailing was sent in September 1990. This mailing described the issues and public comments which resulted from the first mailing. Since the beginning of scoping, a number of meetings have been held with interested individuals, organizations, and agencies. A list of these contacts and meetings is included in Appendix B. The following is a description of the seven issues identified during this public scoping process:

Issue No. 1

Question: How do timber harvest and road building activities affect wildlife habitat?

Overview: The Project Area supports a wide variety of wildlife species. In managed timber stands, the challenge is to provide habitat requirements for management indicator species (MIS) (see Glossary for definition) over long periods. In some cases, this requires modified treatment schedules and specific requirements for stand size and arrangement.

Specific Issue Questions:

1) What are the habitat management objectives for wildlife MIS? The MIS are brown bear, Sitka black-tailed deer, pine martin, bald eagle, brown creeper, hairy woodpecker, red-breasted sapsucker, river otter, Canada goose, and red squirrel.

2) What would be the effects of timber harvest and post-harvest treatments on the wildlife MIS?

3) What would be the effects of roads, LTFs, logging camps, and other proposed facilities on wildlife species?

4) What would be the effects on high volume stands (Volume Classes 6 and 7) in relation to the TTRA proportionality requirement?

5) What would be the effects on biodiversity needs for the Project Area?

Issue No. 2

Question: How would timber harvest and road building activities affect fish habitat?

Overview: The fisheries resource on the Tongass contributes significantly to the economic, recreational, and subsistence needs of Southeast Alaska residents. Streamside habitat provides important shelter, hiding places, food, and rearing areas for Alaska's salmon. Changes in streamside habitat could alter a stream's ability to produce fish.

Specific Issue Questions:

1) What are the habitat management objectives for the fish MIS? These MIS are pink, chum, and coho salmon.

2) What would be the effects of timber harvest and post-harvest treatments on the fish habitat?

3) What would be the effects of roads, LTFs, logging camps, and other proposed facilities on fish habitat?

Issue No. 3

Question: What would be the socioeconomic effects of logging and associated development on Southeast Alaska residents?

Overview: Throughout much of Southeast Alaska, residents depend on the land and its natural resources as part of their livelihood. The economies of whole communities depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, tourism, recreation, timber harvesting, mining, and subsistence. Because of this dependency, management of the Tongass National Forest has been, and continues to be, closely tied to the issue of regional and community socioeconomic development and structure.

Fishing is an important part of the economic base of Southeast Alaska.

In some situations, a positive increase in the development of one industry or lifestyle may negatively affect another. Although there are individuals who rely on subsistence use of forest resources to supplement their income and do not feel a dependence upon industry, there are others who believe it is probably impossible to maintain a subsistence lifestyle without an industry-based, stable economy. There is disagreement among individuals and groups concerning the relative importance of the various industries in Southeast Alaska. Some feel that the economic and social welfare of Southeast Alaska depends upon the timber industry; others feel that recreation, tourism, and fisheries should be emphasized.

Specific Issue Questions:

1) What would be the effects of roads, LTFs, logging camps, and other proposed facilities on the timber, recreation, tourism, wildlife, and fisheries industries?

2) How will timber harvest and post-harvest treatments affect long–term socioeconomic development objectives in Southeast Alaska?

Issue No. 4

Question: How will subsistence uses be affected by proposed timber harvest and road building activities?

Overview: For some people, subsistence is hunting, fishing, trapping, and gathering natural resources to provide needed food which is supplemental to their income. For others, especially Southeast Alaska's Native Americans, subsistence is much more than collecting food—it is a lifestyle that preserves cultural customs and traditions and reflects deeply held attitudes, values, and beliefs.

Specific Issue Questions:

1) What are the specific effects of the proposed actions on subsistence uses?

2) Are there alternatives that would reduce or eliminate the need for timber harvest on lands needed for subsistence uses?

3) Would proposed timber harvest and road-building activities significantly restrict subsistence uses?

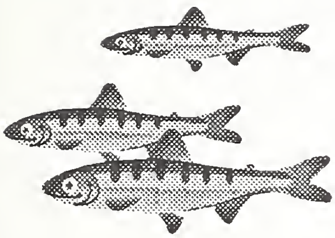
Issue No. 5

Question: Where would LTFs be located and what would be the environmental effects?

Overview: There is public concern about the location of LTFs and the potential environmental effects associated with their construction and operation. This issue encompasses the relationship of LTFs to the road systems and the effects of LTFs on the marine environment, commercial fisheries, visual quality, recreation, subsistence, and other environmental factors.

Specific Issue Questions:

1) How would use of existing LTFs and/or construction of new LTFs affect the marine environment?



2) What are the environmental effects and costs associated with extended timber haul distances (to avoid using some LTF sites)?

3) How does LTF construction and use affect subsistence patterns and opportunities?

4) What effect would LTF construction have on Visual Quality Objectives (VQOs) and recreation use patterns?

5) How will increased access and disturbance associated with LTF construction and use affect fish and wildlife resources?

6) What is the expected life of the structure and its associated environmental effects?

Issue No. 6

Question: What are the transportation system needs in the Southeast Chichagof Project Area which will permit the harvest of timber, and what effect does vehicular travel have on forest resources?

Overview: The existing transportation system in the Southeast Chichagof Project Area was developed almost entirely to access logging sites. Some individuals believe unregulated use of logging roads on Chichagof Island and many parts of Southeast Alaska may have resulted in a variety of consequences including road surface damage, increased erosion, disturbance and increased harvest of wildlife, poaching, defense-of-life and defense-of-property bear kills, and vandalism.

They believe the welfare of many wildlife species requiring undisturbed habitat is being threatened by increased vehicle use throughout Chichagof Island. The number of recreationists, subsistence hunters, trappers, forest workers, and others who travel forest roads is becoming increasingly more important as a factor to consider when attempting to meet National Forest access needs.

The development of a well-managed transportation system would provide opportunities to correct past adverse impacts while accessing new areas for subsistence resources and recreation activities.

Specific Issue Questions:

1) What is the effect of development and use of the transportation system on wildlife?

2) What is the effect of development and use of the transportation system on water quality?

3) What are the costs of road construction, reconstruction, and maintenance for each alternative?

4) What effects do increased transportation system use and development have on public recreational and subsistence experiences?

5) Can the negative effects of transportation system development and use be mitigated?

6) What effect does increased access have on forest resource utilization?

Issue No. 7

Question: How would timber harvest and road construction activities affect recreation and scenic resources?

Overview: Dense spruce and hemlock rain forests, active glaciers, salmon, whales, eagles, bears, and miles of protected waterway, combined with the vast size and remote character of the forest, provide a truly unique natural setting. Outdoor recreation and scenic viewing opportunities offered in and around the Southeast Chichagof Project Area play an important role in the quality of life for local residents. Families have favorite places where they fish, hunt, beachcomb, hike, or just go to get away. Visitors and residents alike recognize the unique scenic and recreational experiences afforded by the lack of roads and necessity for boat access.

Specific Issue Questions:

1) Can the effect of noise and traffic on recreation users be mitigated?

2) Are there unique recreational opportunities or scenic resources available in other areas?

3) Is the proposed action consistent with the VQOs for the area?

4) How will the proposed action affect semiprimitive, nonmotorized recreation use or capacity?

5) How will the proposed action affect semiprimitive, motorized recreation use or capacity?

Sitkoh Lake Cabin

Other Issues Addressed

Two additional concerns were identified during scoping. The first deals with TTRA and the second with monitoring plans. Although both are of interest to the public, neither would have served to guide development of a range of alternatives.

Issue A

Public concern was raised that the TTRA, enacted November 28, 1990, would adversely affect the current plans for management of the Southeast Chichagof Project Area.

Response A

The TTRA will be addressed for all alternatives in the Southeast Chichagof Project Area Final EIS (planning, stream buffers, management requirements, etc.) consistent with the independent timber sale program. The areas within the Project Area which are legislated LUD II by TTRA will not be considered for harvest.

Issue B

Desire was expressed that monitoring plans be developed by the Forest Service during the course of the planning process and not after the EIS.

Response B

A draft monitoring plan is included in Chapter 2.

Issues That Will Not be Addressed

The following issues will not be addressed in this EIS because their resolution is beyond the scope of this document.

Issue C

Some members of the public expressed the belief that the Forest Service mission statement implies the Forest Service must make timber available to the Orient. (The Forest Service mission is to provide a continuing flow of natural resource goods and services to help meet the needs of the Nation and to contribute to the needs of the international community.) The strongest objection was to the phrase "international community."

Response C

The Forest Service mission statement applies to the whole agency and is outside the scope of a project-level plan. For instance, the phrase "and to contribute to the needs of the international community" can be interpreted in many ways, such as research for acid rain, joint studies between Canada and the United States on wood product utilization, and other cooperative research studies. Under no circumstances should people interpret the mission statement as a mandate to make wood from a single National Forest available to the Orient.

Issue D

Some disagreed with the selection of Southeast Chichagof over other areas. Public involvement in a life-of-sale type of plan was suggested so the public could help schedule individual project locations within the APC contract area.

Response D

Many of the "landscape" scale decisions were made in the Tongass Forest Plan through Land Use Designations (LUDs). Other decisions were made by the U.S. Congress. An example would be provisions of the National Forest Management Act (NFMA) and ANILCA related to the APC Long-term Timber Sale Contract, and enactment of the TTRA in 1990. The contract (as modified by legislation) specifies portions of Chichagof, Baranof, and Kuiu islands as the APC contract area. Under the modified contract, a conclusion that insufficient timber volume exists in the contract area is a prerequisite to obtaining timber for the APC contract from other areas. Current information indicates sufficient timber volume remains in the contract area to meet contract volume requirements. The contract modifications in the TTRA eliminated any life-of-sale plan separate from the TLMP (see Appendix A for additional discussion).

The TLMP is currently being revised. The revision process, though well underway, is the appropriate forum for interested public to effect land use prescriptions and management strategies. Part of the revision process includes preparing a tentative 10-year timber harvest schedule. Interested persons are encouraged to make timely input to the Forest Plan revision process concerning future timber harvest schedules.

In addition, the Southeast Chichagof Final EIS includes a detailed analysis of the No-Action Alternative. This alternative will require the Regional Forester to choose another area in order to meet contract volume requirements. It provides a baseline for comparing the action alternatives.

Permits and Licenses

To proceed with the timber harvest as addressed in this Final EIS, various permits must be obtained from other agencies. Administrative actions on these permits would take place after the EIS is filed with the Environmental Protection Agency (EPA). The agencies and their responsibilities are listed below.

U.S. Army Corps of Engineers (COE)

- Approval of discharge of dredged or fill materials into the waters of the United States (Section 404 of the Clean Water Act)

- Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899)

U.S. Environmental Protection Agency (EPA)

- National Pollutant Discharge Elimination System (NPDES) review (Section 402 of the Clean Water Act)

State of Alaska, Department of Natural Resources (DNR)

- Authorization for occupancy and use of tidelands and submerged lands

State of Alaska, Department of Environmental Conservation (DEC)

- Solid Waste Disposal Permit (Section 402 of the Clean Water Act)

- Certificate of Reasonable Assurance (Section 404 of the Clean Water Act)
  U.S. Coast Guard

- Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed on navigable waters

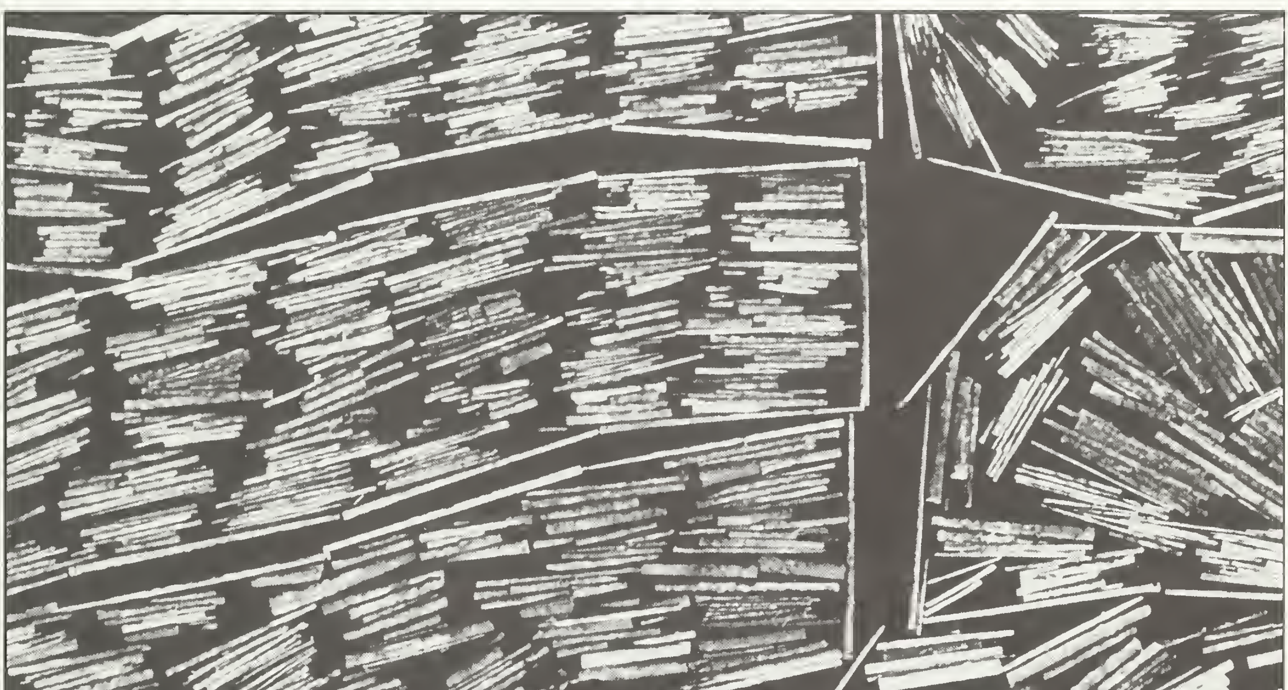
Legislation Related to This EIS

Shown below is a brief list of laws pertaining to preparation of EISs on Federal lands. Some of these laws are specific to Alaska while others pertain to all Federal lands.

- National Historic Preservation Act of 1966
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- Clean Air Act of 1970 (as amended)
- Alaska Native Claims Settlement Act (ANCSA) of 1971
- Marine Mammal Protection Act of 1972
- Endangered Species Act of 1973
- Forest and Rangeland Renewable Resources Planning Act of 1974
- National Forest Management Act (NFMA) of 1976 (as amended)
- Clean Water Act of 1977
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980
- Tongass Timber Reform Act (TTRA) of 1990
- Bald Eagle Protection Act, 16 USCS 668 (1940 as amended)
- Coastal Zone Management Act (CZMA) of 1976

Chapter 2

Alternatives Including the Proposed Action



Chapter 2

Alternatives Including the Proposed Action

Introduction

Chapter 2 presents the alternatives for making timber available to the Alaska Pulp Corporation (APC) while implementing the Tongass Land Management Plan (TLMP) in the Southeast Chichagof Project Area. It also discusses, compares, and evaluates the seven alternatives selected for detailed study. Specifically, this chapter presents the following:

- Alternative development
- Alternatives considered in detail
- Proposed harvest units or combinations of harvest units over 100 acres
- Post-harvest silvicultural treatments
- Enhancement opportunities
- Mitigation measures
- Comparison of alternatives
- Monitoring
- Identification of the Forest Service preferred alternative

Important information from Chapters 3 and 4 is summarized in Chapter 2. These later chapters contain the detailed scientific basis for establishing a baseline and measuring the environmental consequences for each of the alternatives. For a better understanding of the details of the seven alternatives, readers should consult Chapters 3 and 4.

Alternative Development

Each alternative presented in this Final EIS responds differently to the issues discussed in Chapter 1. This process began with the determination of specific options that could be utilized to resolve each issue. These options were then combined with initial alternative themes. Finally, many of the initial alternative themes and options to resolve issues were consolidated to formulate the final alternatives. For this Final EIS, seven alternatives were developed which explore ways to satisfy public concerns and resolve the issues discussed in Chapter 1. Each

action alternative represents a site-specific proposal. From this range of alternatives, the Responsible Official has a basis for judging which one provides the most public benefit.

At the heart of the development of the alternatives is a concept that has been given considerable attention in forest management, New Perspectives which has recently evolved to be called "Ecosystem Management." New Perspectives/Ecosystem Management is an attempt to use new silvicultural strategies and re-evaluate older ones to bring about a different way of thinking about managing our National Forests. The philosophy is to emphasize ecological, physical, and social sciences to ensure that resource management sustains the health and productivity of the land.

New Perspectives/Ecosystem Management looks at forest management on two levels: 1) the landscape level which considers effects of management practices over large areas, which may be either VCU, watershed, or a viewshed; and 2) the stand level which deals with individual harvest units.

Some tools employed at the landscape level may include maintaining large tracts of undisturbed old growth by concentrating timber harvest in certain areas, minimizing the edge effect by designing larger harvest units, and using beach fringe and stream buffers for corridors between old-growth blocks.

Some tools employed at the stand level may include 1) reducing harsh edges by unit placement and feathering edges of cutting units, and 2) providing for stand diversity by leaving snags in harvest units (where safety regulations allow) or retaining small patches of uncut timber in harvest units (where feasible and practical). All of these concepts were considered for the selection and design of individual harvest units and roads. Which tools will be used in a particular harvest unit will be determined at the time the detailed silvicultural prescription is written for each harvest unit.

Alternatives Eliminated from Detailed Study

In an attempt to utilize the present facilities located at the Corner Bay LTF and logging camp, an alternative was developed that would consider constructing an interconnecting road system from Corner Bay (VCU 236) across Kadashan River (VCU 235, a LUD II area) into Crab Bay (VCUs 234 and 233). New LTF and logging camp construction is costly; an interconnecting road system which allows use of existing facilities would be more cost efficient.

The 1986 amendment to the TLMP defines the parameters under which road building may occur within a LUD II area. These include service to mining, power, and water developments; aquaculture developments; transportation needs determined by the State of Alaska; or vital forest transportation system linkages. The Interdisciplinary Team (IDT) felt that this road connection would provide a vital forest transportation system linkage. The Tongass Timber Reform Act (TTRA) requires that a comprehensive study be completed as a part of the TLMP revision process. This study will include, but not be limited to 1) an assessment of the natural, cultural, environmental, fish, and wildlife (including habitat) resources and values of such area; and 2) an assessment of the need for, potential uses of, alternatives to, and environmental impacts of providing a transportation corridor route through the Kadashan River valley. Because this study has not been completed, the alternative will not be evaluated in this project.

Alternatives Considered in Detail

Seven alternatives were considered in detail and are described below. Included are two alternatives that represent the no-action proposal and five other action alternatives that were developed to respond differently to the issues and provide a range of choices for the Regional Forester and the public.

For each action alternative, there is a discussion of the theme or intent of the alternative, guidelines used to select units and roads consistent with the theme, tables summarizing the volume and acres of timber harvest and logging method, and a table showing the roads pro posed for development and use. Following the description of the alternative, there is a presentation of individual harvest units or combinations of units which may exceed 100 acres, post-harvest silvicultural treatments, enhancement opportunities, and mitigation measures.

Kadashan River valley

A systematic, interdisciplinary approach was used in developing the timber harvest unit and transportation system plans for this project. Standards, guidelines, and direction contained in the current TLMP, the Supplement to the Final EIS for the TLMP Revision, Alaska Regional Guide, and applicable Forest Service manuals and handbooks were followed in the design and selection of the harvest units and roads for the alternatives. The combined efforts of the IDT and field crew resulted in a "pool" of harvest units and roads which could be assigned to any of the alternatives. From this unit and road pool, the IDT assigned harvest units and roads to the alternatives based on the alternative theme and guidelines. Mitigation measures, enhancement projects, and the monitoring requirements specific to each alternative were also identified.

Timber volumes were estimated from data gathered in the proposed harvest areas and from recent timber cruise information for current harvest activities in the Project Area (Forest Service 1991a). Stand and logging systems characteristics were also estimated from these sources. Transportation system characteristics and requirements were identified through field reconnaissance. Proposed harvest unit acreage and road mileages were determined using the Chatham Area's Geographic Information Systems (GIS).

Road Management Objectives (RMOs), strategies for road management, were developed by the IDT to address the potential effects that the development and use of roads could have upon resources such as subsistence, wildlife, and recreation. RMOs define the intended purpose of each road proposed for this project. The service duration, scope, maintenance level, and access strategy were developed for each road in each alternative according to its theme.

Clearcutting, an even-aged silvicultural system, is considered the optimum silvicultural system for hemlock-spruce forests and is the primary silvicultural system applied on the Southeast Chichagof Project. However, a few opportunities were identified to remove only a portion of the standing timber for entire units or portions of proposed clearcuts to take advantage of existing advanced regeneration, provide for stand structural diversity, and to leave younger, vigorously growing trees. Concepts developed under New Perspectives/Ecosystem Management, described previously in this chapter, have been incorporated into the design of the harvest units. Specific harvest methods are summarized in the Harvest Unit Design Cards (Appendix C).

The identification of harvest units exceeding 100 acres is displayed for each alternative. Current regional direction in the Alaska Regional Guide (Forest Service 1983) states that:

> 100 acres is the maximum size of created openings to be allowed for the Hemlock-Sitka spruce forest type of coastal Alaska, unless excepted under specific conditions. Recognizing that harvest units must be designed to accomplish management goals, created openings may be larger where larger units will produce a more desirable contribution of benefits.

1969 windthrow at Basket Bay.

The specific conditions listed in the Alaska Regional Guide include considerations for topography, condition of adjacent openings, effects on water quality or quantity, effects on wildlife and fish habitat, regeneration requirements, transportation, economic considerations, and harvest system requirements (if pockets of isolated timber would be created which could not be harvested in the future). Also addressed are the natural and biological hazards such as windthrow, insect or disease problems, and visual absorption capacity. Any unit or combinations of units more than 150 acres in size (for this Final EIS) require approval of the Regional Forester. This approval would be given at the time the ROD is signed and released.

Many of the enhancement opportunities identified for each alternative may be possible through funding under the Knutson-Vanderburg (KV) Act of 1930. The Knutson-Vanderburg Act, as amended by the National Forest Management Act (NFMA) of 1976, allows the Forest Service to collect receipts from timber sales for Sale Area Improvement (SAI) projects. Top priority for these funds is to ensure stand regeneration. Subsequent projects, such as precommercial thinning, fisheries enhancement, and soil stabilization, are prioritized and listed on the SAI plan. If funding for resource enhancement projects is not available from KV receipts, then these projects could be added to the regular program budget. The SAI plan will be developed after the ROD is signed. Each of the seven alternatives considered is described below.

Alternative A1: No-Action—Current Direction

The theme of this alternative is to propose no new timber harvest or road construction in the Southeast Chichagof Project Area at the present time. However, timber harvest and road construction activities within the Project Area that have been previously approved by the Final Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods (SEIS) would continue. This alternative represents the "No-Action" Alternative as required under the National Environmental Policy Act of 1969 (NEPA).

Table 2-1 displays the remaining SEIS-related harvest units that will not be harvested at the time of the signing of the ROD for this project and for which harvest activity would continue under this alternative. Road construction activities related to these units are expected to be completed by the signing of the ROD and are, thus, not included in this alternative. Appendix Table F-6 displays the existing roads and summarizes the road management strategies for this alternative.

For purposes of comparing environmental effects, this alternative assumes that additional timber volume would not be available elsewhere within the APC Long-term Timber Sale Contract area to replace the volume expected from this Project Area. Selection of this alternative would require timber to be made available from another area to meet contract requirements. Alternative Map A1/A2 (in map packet enclosed with this Final EIS) illustrates the roads, harvest units, and geographic features of the Southeast Chichagof Project Area for this alternative.

Table 2-1
Alternative A1—SEIS[1] Remaining Harvest

VCU	Harvest Unit	Total Volume[2] (MBF)	Total Acres	Volume/ Acre
242	218	1,737	92	18.9
VCU Total		1,737	92	18.9
243	105	1,944	95	20.5
	106	1,268	70	18.1
	108	2,103	99	21.3
	109	1,183	56	21.3
	111	2,932	115	25.5
	129	911	45	20.2
	130	1,120	70	16.0
VCU Total		11,461	550	20.84
Total		13,198	642	20.6

SOURCE: Lilly 1992.

[1] Final Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods.

[2] Net sawlog volume; MBF= One thousand board feet

Alternative A2: No-Action—No Further Harvest

The theme of this alternative is to propose no timber harvest or road construction in the Southeast Chichagof Project Area at the present time. In addition, approximately 13.2 million board feet (MMBF) of timber harvest activities within the Project Area previously approved by the Final Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods (SEIS) but not harvested (see Table 2-1)would be cancelled.

This alternative represents one version of the No-Action Alternative as required by NEPA. The U.S. District Court for the District of Alaska declared that for purposes of a site-specific timber harvest EIS (such as this one), "no action" means "suspension of harvest activity" (U.S. District Court, June 1990). It serves as a benchmark by which effects of all action alternatives are measured. In this alternative all existing timber harvest operations within the boundaries of the Project Area would be halted and no new timber harvest or road construction would be proposed. Appendix Table F-6 displays the existing roads and summarizes the road management strategies for this alternative.

To evaluate environmental effects and provide a true "no-action" baseline, this alternative assumes that additional timber volume would not be available from somewhere else within the APC Long-term Timber Sale Contract area. Selection of this alternative would require timber to be made available from another area to meet contract requirements. Alternative Map A1/A2 illustrates the roads, harvest units, and geographic features of the Southeast Chichagof Project Area for this alternative.

Alternative B

The theme of this alternative is to focus the proposed actions in six VCUs in the northwest half of the Project Area (VCUs 230 to 234, and 246). This approach concentrates timber harvest and road construction away from the VCUs where most of the recent timber harvests have occurred (VCUs 236, 238, 239, and 241 to 245).

Implementation of this alternative would schedule harvest of 4,191 acres in 117 harvest units for approximately 137.4 MMBF of sawlog and utility volume, indicating an average unit size of 36 acres. To implement this level of harvest, 67.1 miles of new road would be constructed and 13.5 miles would be reconstructed. This indicates an average of 2.0 MMBF per mile of new road construction.

This alternative would utilize the existing LTF and logging camp at False Island. Roadbuilders may have a 20-person floating camp at Crab Bay. An interconnecting road would have to be constructed from the False Island LTF northwest past Oly Creek to connect with the logging roads proposed for VCU 246. Alternative Map B illustrates the roads, harvest units, and geographic features of the Southeast Chichagof Project Area for this alternative.

Guidelines used in selecting units and roads include the following:

- Locate harvest units and roads to interconnect the road system, to minimize road miles, and to reduce LTFs and logging camps by concentrating activities in a few areas (Issues 3, 5 and 6).

- Cluster individual harvest units into fewer watersheds in the northwest half of the Project Area, leaving the watersheds in the rest of the Project Area unchanged for wildlife and fish habitats, recreation, scenic, and subsistence resources (Issues 1, 2, 4, and 7).

Alternative B proposes to interconnect the road system to reduce LTFs.

The following tables summarize the major activities associated with this proposal and with timber harvest and road access for each VCU. Table 2-2 shows net sawlog volume, utility log volume, and total log volume. Table 2-3 shows the acres of proposed harvest by logging method. Table 2-4 summarizes miles of road proposed in this alternative. Appendix F, Table F-1 shows the units specific to this alternative. Table F-7 displays the roads and summarizes the road management strategies for the alternative.

Table 2-2
Alternative B—Harvest by Net Sawlog and Utility Log (rounded to nearest 10 MBF)

VCU	Net Sawlog Volume	Utility Log Volume	Total Volume
230	17,150	3,600	20,750
231	20,010	4,200	24,210
232	22,640	4,760	27,400
233	12,460	2,620	15,080
234	11,110	2,330	13,440
246	30,190	6,350	36,540
Total	113,560	23,860	137,420

SOURCE: Lilly 1992.

Table 2-3
Alternative B—Proposed Harvest Systems (in acres)

VCU	Shovel	High-lead	Slack-line	Running Skyline	Live Skyline	VCU Total
230	0	38	109	374	205	726
231	16	81	185	307	0	589
232	12	43	256	383	60	754
233	0	33	99	313	118	563
234	0	23	116	318	26	483
246	50	35	299	692	0	1,076
Total	78	202	1,064	2,387	409	4,191
Percent of Total	2	6	25	57	10	100

SOURCE: Lilly 1992.

Table 2-4
Alternative B—Proposed Transportation System (in miles)

VCU	New Construction	Reconstruction	Temporary	Total
230	9.8	2.3	5.0	17.1
231	11.4	0.0	3.3	14.7
232	11.0	0.0	6.7	17.7
233	7.3	5.6	2.1	15.0
234	0.9	5.6	4.0	10.5
245	6.4	0.0	0.0	6.4
246	20.3	0.0	8.0	28.3
Total	67.1	13.5	29.1	109.7
Percent of Total	61	12	27	100

SOURCE: Kosak and Allio 1992.

Alternative C

The theme of this alternative is to focus the proposed actions, as much as possible, in watersheds which have been previously harvested. It also maintains ecosystem connectivity between the Lisianski River—Upper Hoonah Sound LUD II Management Area C35 and the Kadashan LUD II Management Area C36. This connectivity is maintained by not proposing activities in VCU 246. The alternative also maintains the essentially unroaded character of VCUs 232 and 240.

Implementation of this alternative would schedule harvest of 3,292 acres in 83 harvest units for approximately 111.0 MMBF of sawlog and utility volume. This indicates an average unit size of 40 acres. To implement this level of harvest, 25.5 miles of new road would be constructed and 23.2 miles would be reconstructed. This indicates an average of 4.4 MMBF per mile of new road construction.

Four LTFs would be required by this alternative. Two would be located at former LTF sites at Inbetween (VCU 230; a temporary low-angle slide facility) and Crab Bay (VCU 233; a permanent low-angle slide facility). The existing LTF sites at Corner Bay (VCU 236) and False Island (VCU 245) also would be used. Associated with these LTFs, two logging camps are expected to be used. The existing camps at Corner Bay and False Island would be maintained. Roadbuilders may have a 20-person floating camp at Crab Bay. Alternative Map C displays the spatial relationship between roads, units, and other geographic features of the Southeast Chichagof Project Area for this alternative.

Guidelines used in selecting units and roads include the following:

- Design the transportation system to minimize road miles and stream crossings. Harvest units and roads would be located to minimize interconnecting road miles (Issues 5 and 6).
- Cluster individual harvest units as much as possible in watersheds which have been previously harvested, leaving the watersheds in the rest of the Project Area unchanged for wildlife and fish habitats, recreation, scenic, and subsistence resources (Issues 1, 2, 4, and 7).

The following tables summarize the major activities associated with this proposal and with timber harvest and road access for each VCU. Table 2-5 shows net sawlog volume, utility log volume, and total log volume. Table 2-6 shows the acres of proposed harvest by logging method. Table 2-7 summarizes miles of road proposed in this alternative. Appendix F, Table F-2 shows the units specific to this alternative; Table F-8 displays the roads and summarizes the road management strategies for the alternative.

Table 2-5
Alternative C—Harvest by Net Sawlog and Utility Log (rounded to the nearest 10 MBF)

VCU	Net Sawlog Volume	Utility Log Volume	Total Volume
230	15,510	3,260	18,770
231	15,800	3,320	19,120
232	70	10	80
233	11,540	2,420	13,960
234	11,080	2,330	13,410
236	10,700	2,250	12,950
239	21,420	4,490	25,910
241	5,620	1,180	6,800
Total	91,740	19,260	111,000

SOURCE: Lilly 1992.

Table 2-6
Alternative C—Proposed Harvest Systems (in acres)

VCU	Shovel	High-lead	Slack-line	Running Skyline	Live Skyline	Heli-copter	VCU Total
230	0	38	96	314	205	0	653
231	16	81	179	167	0	0	443
232	0	0	0	0	3	0	3
233	0	0	106	286	81	0	473
234	0	20	116	318	26	0	480
236	0	0	0	0	0	339	339
239	0	0	0	0	0	719	719
241	0	17	107	58	0	0	182
Total	16	156	604	1,143	315	1,058	3,292
Percent of Total	<1	5	18	35	10	32	100

SOURCE: Lilly 1992.

Large blocks of the Project Area will remain in relatively natural condition with the implementation of Alternative C.

Table 2-7

Alternative C—Proposed Transportation System (in miles)

VCU	New Construction	Reconstruction	Temporary	Total
230	9.8	2.5	4.3	16.6
231	6.6	0.0	1.9	8.5
233	5.2	5.6	2.0	12.8
234	0.9	5.4	3.8	10.1
236	0.0	0.0	0.3	0.3
239	0.0	1.3	0.7	2.0
241	3.0	4.6	1.7	9.3
242	0.0	3.8	0.0	3.8
Total	25.5	23.2	14.7	63.4
Percent of Total	40	36	24	100

SOURCE: Kosak and Allio 1992.

Alternative D

The theme of this alternative is to distribute new timber harvest throughout the 10 VCUs being considered for entry at this time (VCUs 230 through 234, 236, 239, 240, 241, and 246). This approach emphasizes reduction of resource conflicts between development activities and nontimber resources by providing spatial distance between the harvest units. Harvest units are located throughout the Project Area to minimize cumulative effects within a watershed. The alternative also attempts to develop a transportation system that meets timber and other resource management objectives for both the short term and the long term. The transportation system is designed to attempt to interconnect the road systems within the Project Area.

Implementation of this alternative would schedule harvest of 3,818 acres in 83 harvest units for approximately 132.0 MMBF of sawlog and utility volume, indicating an average unit size of 46 acres. To implement this level of harvest, 61.4 miles of new road would be constructed and 23.8 miles would be reconstructed. This indicates an average of 2.2 MMBF per mile of new road construction. The Kadashan study mandated by TTRA is evaluating two of the interconnecting routes proposed in this alternative. These routes are White Rock Tie Road and the Basket Lake Tie Road.

Two LTFs would be required by this alternative. A new barge facility would be located near the former LTF site at Oly Creek (VCU 245) and the current LTF site at Corner Bay (VCU 236) would be used. Associated with these LTFs, two logging camps are expected to be used. The existing camps at Corner Bay and False Island are expected to be utilized. Roadbuilders may have a 20-person floating camp at Crab Bay. Alternative Map D illustrates the roads, harvest units, and geographic features of the Project Area.

Guidelines used in selecting units and roads include the following:

- Disperse activities over a wide area to maintain a diversity of wildlife habitats within a watershed and to reduce the concentration of development activities in subsistence use areas (Issues 1 and 4).

- Emphasize long-term timber production and road access by developing access to more watersheds in the Project Area (Issue 3 and 6).

The following tables summarize the major activities associated with this proposal and with timber harvest and road access for each VCU. Table 2-8 shows net sawlog volume, utility log volume, and total log volume. Table 2-9 shows the acres of proposed harvest by logging method. Table 2-10 summarizes miles of road proposed in this alternative. Appendix F, Table F-3 shows the units specific to this alternative; Table F-9 displays the roads and summarizes the road management strategies for the alternative.

Table 2-8
Alternative D—Harvest by Net Sawlog and Utility Log (rounded to the nearest 10 MBF)

VCU	Net Sawlog Volume	Utility Log Volume	Total Volume
230	8,210	1,720	9,930
231	16,310	3,430	19,740
232	9,720	2,040	11,760
233	7,400	1,560	8,960
234	6,810	1,430	8,240
236	8,030	1,690	9,720
239	13,620	2,860	16,480
240	14,790	3,100	17,890
241	6,340	1,330	7,670
246	17,890	3,760	21,650
Total	109,120	22,920	132,040

SOURCE: Lilly 1992.

Alternative D utilizes the existing camp and LTF at Corner Bay.

Table 2-9
Alternative D—Proposed Harvest Systems (in acres)

VCU	Shovel	High-lead	Slack-line	Running Skyline	Live Skyline	Heli-copter	VCU Total
230	0	19	0	139	147	0	305
231	16	81	193	174	0	0	464
232	6	43	41	231	44	0	365
233	0	0	62	166	94	0	322
234	0	0	90	160	26	0	276
236	0	0	0	0	251	343	251
239	0	0	0	0	0	451	451
240	4	76	79	316	67	0	542
241	14	17	107	58	0	0	196
246	33	0	145	468	0	0	646
Total	73	217	736	1,712	702	794	3,818
Percent of Total	2	6	19	45	18	20	100

SOURCE: Lilly 1992.

Table 2-10
Alternative D—Proposed Transportation System (in miles)

VCU	New Construction	Re-Construction	Temporary	Total
230	5.1	2.3	1.7	9.2
231	8.2	0.0	1.9	10.1
232	7.9	0.0	1.3	9.2
233	5.6	7.4	1.2	12.3
234	0.9	4.4	2.3	7.6
236	0.0	0.0	0.3	0.3
239	0.0	1.3	1.5	2.8
240	8.7	0.0	1.5	13.0
241	3.7	4.6	2.5	13.1
242	3.0	3.8	0.0	5.2
245	1.2	0.0	0.0	1.2
246	17.1	0.0	3.8	20.9
Total	61.4	23.8	18.0	103.2
Percent of Total	59	23	17	100

SOURCE: Kosak and Allio 1992.

Alternative E

The theme of this alternative is to focus the proposed actions away from salmon streams, lakes, saltwater, and riparian areas and concentrate activities in higher elevations and upper valleys. This alternative disperses the proposed activities throughout nine VCUs in Management Areas C34 and C37 (VCU 230 through 234, 236, 239, 240, and 246).

Implementation of this alternative would schedule harvest of 3,668 acres in 97 harvest units for approximately 125.6 MMBF of sawlog and utility volume, indicating an average unit size of 38 acres. To implement this level of harvest, 54.1 miles of new road would be constructed and 14.5 miles would be reconstructed. This indicates an average of 2.3 MMBF per mile of new road construction.

Four LTFs would be required by this alternative. Two would be located at former LTF sites at Inbetween (VCU 230; a temporary low-angle slide facility), Crab Bay (VCU 233; a permanent low-angle slide facility). A temporary barge facility would be located near the former LTF site at Oly Creek (VCU 245). The existing LTF site at Corner Bay (VCU 236) would also be used. Existing logging camps at Corner Bay and False Island are expected to be utilized. Roadbuilders may have a 20-person floating camp at Crab Bay. Alternative Map E illustrates the roads, harvest units, and geographic features of the Southeast Chichagof Project Area for this alternative.

Guidelines used in selecting units and roads include the following:

- Concentrate harvest units above the 500-foot elevation to avoid deer winter range and in clusters to maximize undisturbed habitat. Locate activities to minimize the effect on wildlife travel corridors, including the effects of blowdown (Issue 1).

- Locate proposed roads to maximize the average distance from streams and lakes and to minimize the number of stream crossings. Locate proposed activities to avoid areas with major sockeye and steelhead runs and areas of riparian soils (Issue 2).

- Locate road construction and timber harvest activities to avoid unique recreation places and sites. Attempt to avoid activities in proximity to recreation facilities and other areas of recreational use such as streams, lakes, and beaches. Minimize the number and size of harvest units in areas visible from salt water, lakes, or recreation facilities (Issues 5 and 6).

- Meet Visual Quality Objectives (VQOs) along tour ship and small cruise boat travel routes. This would be accomplished through placement and shaping of units (Issue 3 and 5).

The following tables summarize the major activities associated with this proposal and with timber harvest and road access for each VCU. Table 2-11 shows net sawlog volume, utility log volume, and total log volume. Table 2-12 shows the acres of proposed harvest by logging method. Table 2-13 summarizes miles of road proposed in this alternative. Appendix F, Table F-4 shows the units specific to this alternative; and Table F-10 displays the roads and summarizes the road management strategies for the alternative.

Table 2-11
Alternative E—Harvest by Net Sawlog and Utility Log (rounded to the nearest 10 MBF)

VCU	Net Sawlog Volume	Utility Log Volume	Total Volume
230	8,850	1,860	10,710
231	12,080	2,540	14,620
232	14,830	3,110	17,940
233	7,900	1,650	9,550
234	7,530	1,580	9,110
236	10,700	2,250	12,950
239	18,530	3,890	22,420
240	5,830	1,230	7,060
246	17,520	3,680	21,200
Total	103,770	21,790	125,560

SOURCE: Lilly 1992.

Table 2-12

Alternative E—Proposed Harvest Systems (in acres)

VCU	Shovel	High-lead	Slack-line	Running Skyline	Live Skyline	Heli-copter	VCU Total
230	0	0	77	179	94	0	350
231	16	26	60	208	0	0	310
232	6	43	177	247	0	0	473
233	0	33	90	228	57	0	408
234	0	3	65	184	0	0	252
236	0	0	65	0	0	339	339
239	0	0	0	0	0	614	614
240	0	34	0	147	36	0	217
246	0	53	173	479	0	0	705
Total	22	192	642	1,672	187	953	3,668
Percent by Total	1	5	17	46	5	26	100

SOURCE: Lilly 1992.

Table 2-13

Alternative E—Proposed Transportation System (in miles)

VCU	New Construction	Re-Construction	Temporary	Total
230	7.5	2.5	1.9	11.9
231	5.7	0.0	2.3	8.0
232	8.4	0.0	4.0	12.4
233	6.7	5.6	1.4	13.7
234	0.9	5.1	2.7	8.7
236	0.0	0.0	0.3	0.3
239	1.5	1.3	0.7	3.5
240	4.8	0.0	0.5	5.3
245	0.6	0.0	0.0	0.6
246	18.0	0.0	7.2	25.2
Total	54.1	14.5	21.0	89.6
Percent of Total	62	16	22	100

SOURCE: Kosak and Allio 1992.

Alternative F

The theme of this alternative is to focus the proposed actions, as much as possible, in watersheds which have been previously harvested and away from the primary recreation and subsistence use areas around lakes and along salt water. This alternative proposes activities within areas of previous timber harvest and road construction activities (VCUs 230, 233, 234, 236, 239, and 241). It extends the proposed road construction and timber harvest into VCU 246. The alternative maintains the essentially unroaded character of VCUs 231, 232, and 240.

Implementation of this alternative would schedule harvest of 3,304 acres in 92 harvest units for approximately 104.5 MMBF of sawlog and utility volume, indicating an average unit size of 36 acres. To implement this level of harvest, 36.8 miles of new road would be constructed and 21.8 miles would be reconstructed. This indicates an average of 2.8 MMBF/mile of road.

Four LTFs would be required. One would be located at a former LTF site at Inbetween (VCU 230; a temporary low-angle slide facility), a new site at Oly Creek (VCU 245; a temporary barge facility), and two at current LTF sites at Corner Bay (VCU 236) and False Island (VCU 245). Associated with these LTFs, two logging camps are expected to be utilized. The two existing camps at Corner Bay and False Island would be maintained. Roadbuilders may have a 20-person floating camp at Crab Bay. Alternative Map F displays the spatial relationship between roads, units, and other geographic features of the Southeast Chichagof Project Area for this alternative.

Guidelines used in selecting units and roads include the following:

- Locate road construction and timber harvest activities to avoid unique recreation places and sites. Attempt to avoid activities in close proximity to recreation facilities, and other areas of recreational use such as streams, lakes, and beaches. Minimize the number and size of harvest units in areas visible from salt water, lakes, or recreation facilities.
- Avoid significant subsistence use areas as identified in Tongass Resource Use Cooperative Study (TRUCS) (Issue 4).
- Design the transportation system to minimize road miles and the number of stream crossings. Harvest units and roads would be located to minimize interconnecting road miles, and to minimize the number of associated logging camps (Issues 5 and 6).
- Meet VQOs along tour ship and small cruise boat travel routes. This would be accomplished through placement and shaping of units (Issue 7).
- Cluster individual harvest units as much as possible in watersheds which have been previously harvested, leaving the watersheds in the rest of the Project Area unchanged for wildlife and fish habitats, recreation, scenic, and subsistence resources (Issues 1, 2, 4, and 7).

The following tables summarize the major activities associated with this proposal and with timber harvest and road access for each VCU. Table 2-14 shows net sawlog volume, utility log volume, and total log volume. Table 2-15 shows the acres of proposed harvest by logging method. Table 2-16 summarizes miles of road proposed in this alternative. Appendix F, Table F-5 shows the units specific to this alternative, and Table F-11 displays the roads and summarizes the road management strategies for the alternative.

Many view Southeast Alaska from the Alaska Marine Highway.

Table 2-14
Alternative F—Harvest by Net Sawlog and Utility Log (rounded to the nearest 10 MBF)

VCU	Net Sawlog Volume	Utility Log Volume	Total Volume
230	15,350	3,220	18,570
233	8,480	1,780	10,260
234	9,680	2,030	11,710
236	10,700	2,240	12,940
239	17,540	3,690	21,230
241	4,290	900	5,190
246	20,320	4,270	24,590
Total	86,360	18,130	104,490

SOURCE: Lilly 1992.

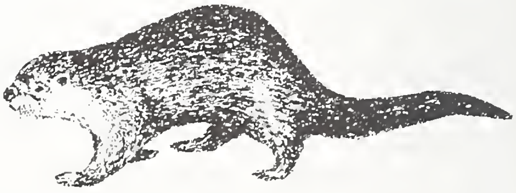


Table 2-15
Alternative F—Proposed Harvest Systems (in acres)

VCU	Shovel	High-lead	Slack-line	Running Skyline	Live Skyline	Heli-copter	VCU Total
230	0	38	109	351	176	0	674
233	0	33	99	216	33	0	381
234	0	3	91	271	26	0	391
236	0	0	0	0	0	339	339
239	0	0	0	0	0	586	586
241	0	17	107	32	0	0	156
246	0	0	202	575	0	0	777
Total	0	91	608	1,445	235	925	3,304
Percent of Total	0	3	18	44	7	28	100

SOURCE: Lilly 1992.

Table 2-16
Alternative F—Proposed Transportation System (in miles)

VCU	New Construction	Reconstruction	Temporary	Total
230	9.6	2.5	4.9	17.0
233	5.2	5.3	1.4	11.9
234	0.9	5.0	3.0	8.9
236	0.0	0.0	0.3	0.3
239	0.0	1.3	0.7	2.0
241	3.3	3.8	1.4	8.5
242	0.0	3.9	0.0	3.9
245	0.6	0.0	0.0	0.6
246	17.2	0.0	7.2	24.4
Total	36.8	21.8	18.9	77.5
Percent of Total	47	28	25	100

SOURCE: Kosak and Allio 1992.

Proposed Harvest Units or Combinations of Harvest Units Over 100 Acres

Table 2-17 displays harvest units or combinations of harvest units considered for inclusion into one or more alternatives and the factors used in designing each opening. In each case, these units or combinations resulted in a created opening of over 100 acres.

Table 2-17
Proposed Harvest Units or Combination of Harvest Units Over 100 Acres

Unit Numbers	Total Acres	Alternatives	Factors Considered
1210	109	C, D, E, F	Factors warranting a larger size include 1) transportation and harvesting system requirements, and 2) relative costs of preparation, logging, and administration of harvest units. (Helicopter Unit)
1590, 1593	118	B, C, D	Factors warranting a larger size include 1) topography, and 2) transportation and harvesting system requirements.
2570	104	B, D, E	Factors warranting a larger size include 1) topography, and 2) transportation and harvesting system requirements.
1850, 1853	101	B, C, E, F,	Factors warranting a larger size include 1) topography, and 2) transportation and harvesting system requirements.

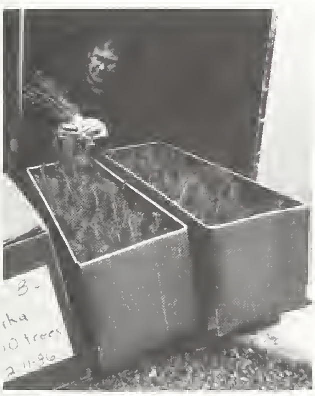
SOURCE: Lilly 1992.

Post-harvest Silvicultural Treatments

This section identifies specific post-harvest silvicultural treatments expected to occur in the Southeast Chichagof Project Area after timber harvest activities are completed. These treatments include hand planting, precommercial thinning of proposed harvest units, and a survey of possible precommercial thinning of previously harvested areas. Both hand planting and precommercial thinning of proposed harvest units are displayed by alternative.

Hand Planting

Tables 2-18 through 2-22 display an estimate of hand planting proposed for each alternative to maintain current species composition or to meet National Forest Management Act (NFMA) requirements for adequate stocking. Planting of Alaska yellow-cedar is proposed for most of this acreage to maintain tree species and wildlife habitat diversity.



Hand planting can accelerate regeneration after harvest.

Table 2-18
Alternative B—Hand Planting

VCU	Total Acres	Units
230	146	1540, 1670, 1680
231	175	1691, 2140, 2141, 2142, 2210
232	240	2450, 2451, 2480, 2540, 2570, 2 630
234	80	1850, 1852, 1853
246	253	3570, 3740, 3820, 4140, 4141, 4142, 4200, 4201, 4220
Total	894	

SOURCE: Lilly 1992.

Table 2-19
Alternative C—Hand Planting

VCU	Total Acres	Units
230	146	1540, 1670, 1680
231	223	1691, 2110, 2140, 2141, 2142
234	80	1850, 1852, 1853
Total	449	

SOURCE: Lilly 1992.

Table 2-20
Alternative D—Hand Planting

VCU	Total Acres	Units
230	57	1680
231	190	1691, 2110, 2140
232	89	2540, 2570
234	60	1850, 1852, 1870
246	195	3570, 3740, 4140, 4141, 4142, 4200, 4220
Total	591	

SOURCE: Lilly 1992.

Table 2-21
Alternative E—Hand Planting

VCU	Total Acres	Units
230	89	1540, 1670
232	181	2450, 2451, 2480, 2570
234	50	1850, 1853
246	62	3820, 4140, 4141, 4142
Total	382	

SOURCE: Lilly 1992.

Table 2-22
Alternative F—Hand Planting

VCU	Total Acres	Units
230	146	1540, 1670, 1680
234	80	1850, 1852, 1853
246	127	3740, 3820, 4140, 4141, 4142, 4220
Total	353	

SOURCE: Lilly 1992.

Precommercial Thinning

Precommercial thinning to improve timber production is projected for the areas listed below by alternative in Tables 2-23 through 2-27. These areas would be investigated for thinning between 10 and 12 years after harvest.

Table 2-23
Alternative B—Precommercial Thinning

VCU	Acres	Units
230	104	1620, 1650, 1660
231	140	2080, 2100, 2192, 2200, 2210
232	52	1450, 2520
233	92	1960, 1981, 1992
234	120	1811, 1820, 1853
246	205	3500, 3550, 3551, 3570, 4142, 4220, 4260, 4261
Total	713	

SOURCE: Lilly 1992.

Table 2-24
Alternative C—Precommercial Thinning

VCU	Acres	Units
230	89	1620, 1650
231	60	2090
233	92	1960, 1981, 1992
234	120	1811, 1820, 1853
236	313	1050, 1090, 1091, 1110, 1120, 1121, 1130
239	258	1161, 1162, 1210, 1230, 1240, 1340, 1401
241	187	3031, 3050, 3051, 3061, 3100
Total	1,121	

SOURCE: Lilly 1992.

Table 2-25
Alternative D—Precommercial Thinning

VCU	Acres	Units
231	62	2090
233	39	1992
234	55	1820
236	304	1020, 1050, 1090, 1091, 1110
239	148	1210, 1230, 1240
240	98	2750, 2770
241	147	3031, 3050, 3100
246	113	3500, 3570, 4142, 4220
Total	966	

SOURCE: Lilly 1992.

Table 2-26
Alternative E—Precommercial Thinning

VCU	Acres	Units
230	24	1620
231	55	2192, 2200, 2210
232	33	2450
233	84	1981, 1992
234	94	1820, 1853
236	405	1020, 1050, 1090, 1091, 1110, 1120, 1121, 1130
239	210	1161, 1162, 1220, 1230, 1240, 1330
240	51	2770
246	49	4142, 4260, 4261
Total	1,005	

SOURCE: Lilly 1992.

Table 2-27
Alternative F—Precommercial Thinning

VCU	Acres	Units
230	104	1620, 1650, 1660
233	92	1960, 1981, 1992
234	120	1811, 1820, 1853
236	313	1050, 1090, 1091, 1110, 1120, 1121, 1130
239	182	1161, 1162, 1210, 1230, 1240
241	173	3031, 3050, 3061, 3100
246	84	4142, 4220, 4260, 4261
Total	1,068	

SOURCE: Lilly 1992.

Past harvest is surveyed for possible precommercial thinning.

Enhancement Opportunities

The following enhancement opportunities identified for the action alternatives may require further analysis and disclosure per NEPA requirements before their implementation.

- Fish passage facilities in the form of fish ladders, jump pools, or resting pools could be constructed along the specific creeks. These enhancements would make available additional habitat for pink and coho salmon (Table 2-28).

Table 2-28
Fish Passage Construction Opportunities

Alternative	Miles of Habitat	Creeks
B	10.2	Fog, Broad, Broadfinger, Crab, Little Seal
C	4.7	Fog, Crab, Little Seal
D	13.0	Sitkoh, Fog, Broad, Broadfinger, Crab, Little Seal
E	10.2	Fog, Broad, Broadfinger, Crab, Little Seal
F	9.2	Fog, Broad, Broadfinger, Little Seal

SOURCE: Kosak and Allio 1992.

- Stream rehabilitation opportunities exist on Class I streams and alluvial fan channels that have been harvested in Saltery Bay, Crab Bay, and South Crab Bay.

- Fish habitat enhancement through activities such as soil stabilization, stream rehabilitation, stream bank stabilization, lake fertilization studies, and salmon rearing improvements could be scheduled using KV or program funding in the subwatersheds for this alternative shown in Tables 2-29 through 2-33. This would also create borrow-type ponds in the specified subwatershed for fish and wildlife habitat and would provide a source of gravel for road construction and reconstruction. These activities would increase either the quantity of habitat or quality of in-stream habitat for anadromous species.

A steep-pass fish ladder

Table 2-29
Alternative B—Fish Habitat Enhancement Projects

Subwatershed Number	Reference Location	Harvest Units Within Subwatershed	Ponds Created
161A	Broad Creek	4141	
162A	Broad Finger	3810	
H12A	Fog Creek	1810, 1830	•
G71A	Crab Bay	2440, 2480	
G61A	Saltery Bay	2110, 2100	•
G81A	South Crab Bay	1972	

SOURCE: Paustian and Kelliher 1992.

Table 2-30
Alternative C—Fish Habitat Enhancement Projects

Subwatershed Number	Reference Location	Harvest Units Within Subwatershed	Ponds Created
H12A	Fog Creek	1810, 1830	•
G61A	Saltery Bay	2110, 2100	•
G81A	South Crab Bay	1972	•
131B	Sitkoh Lake	None	
H61A	Kook Lake	1340,1370,1390,1401	

SOURCE: Paustian and Kelliher 1992.

Table 2-31
Alternative D—Fish Habitat Enhancement Projects

Subwatershed Number	Reference Location	Harvest Units Within Subwatershed	Ponds Created
161A	Broad Creek	4141	
162A	Broad Finger	3810	
H12A	Fog Creek	1810, 1830	•
G71A	Crab Bay	2440, 2480	•
G61A	Saltery Bay	2110, 2100	•
G81	South Crab Bay	1972	•
H61A	Kook Lake	None	
131B	Sitkoh Lake	None	

SOURCE: Paustian and Kelliher 1992.

Table 2-32
Alternative E—Fish Habitat Enhancement Projects

Subwatershed Number	Reference Location	Harvest Units Within Subwatershed	Ponds Created
161A	Broad Creek	4141	
162A	Broad Finger	3810	
H12A	Fog Creek	1810, 1830	•
G71A	Crab Bay	2440, 2480	•
G61A	Saltery Bay	2110, 2100	•
G81A	South Crab Bay	1972	
H61A	Kook Lake	1161, 1162, 1330	

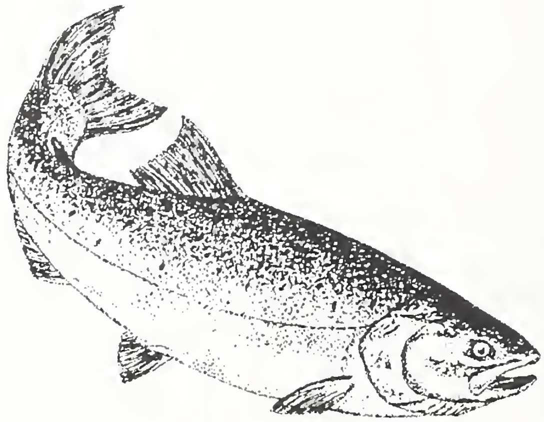
SOURCE: Paustian and Kelliher 1992.

Table 2-33
Alternative F—Fish Habitat Enhancement Projects

Subwatershed Number	Reference Location	Harvest Units Within Subwatershed	Ponds Created
161A	Broad Creek	4141	
162A	Broad Finger	3810	
H12A	Fog Creek	1810, 1830	•
G81A	South Crab Bay	1972	•

SOURCE: Paustian and Kelliher 1992.

- Maintenance Level 1 roads could be brushed and used as trails.
- The trail from the saltwater at Basket Bay to the eastern shore of Kook Lake could be reconstructed. An overnight shelter could be built on the eastern shoreline of Kook Lake.
- Recreation cabins could be constructed at False Island, Sitkoh Bay, and Saltery or Crab Bay.
- The thermal hot springs at Broad Creek could be developed in Alternatives B, D, E, and F, depending on the Federal Laws governing these special areas.



Mitigation Measures

The Forest Service uses numerous mitigation and preventative measures in the planning and implementation of land management activities. The application of these measures begins during the planning phases of a project. They link to the overall Forest, Chatham Area, and Ranger District management direction and continue through all phases of subsequent forest management. Standards, guidelines, and direction contained in the current TLMP, the recent Supplement to the Draft EIS for the TLMP Revision, Alaska Regional Guide, and applicable Forest Service manuals and handbooks have been applied in the development of alternatives and the design of harvest units and roads.

Additional mitigation measures adopted to reduce or eliminate adverse effects are identified at the time the ROD is signed. Public comment on the Draft EIS was helpful in identifying when and where mitigation measures should be considered for use. Listed below is a brief summary of some of the mitigation measures common to all alternatives. Specific mitigation measures, as applied to each individual unit, can be seen in the "As Planned" unit layout cards. These unit cards are an important tool for implementing the project, as they list standards and guidelines and provide a mechanism for tracking the project implementation. In addition, specific road closure options are presented as a mitigation measure for potential brown bear impacts. Road closure options may also have an impact on recreation and subsistence users. Unit cards also contain an evaluation of the potential effectiveness of the mitigation measures being proposed. Unit Cards may be found in Appendix J.

Water Quality and Fish Production

Mitigation which protects water quality and fish habitat includes application of the Best Management Practices (BMPs) stated in the Soil and Water Conservation Handbook (USDA FSH 2509.22). This handbook provides standard operating procedures for all stream classes. In addition, the TTRA mandates a minimum 100-foot buffer on all Class I streams and on Class II streams that flow directly into Class I streams. Of note is that the 100-foot stream buffer width mandated by TTRA is a minimum. The width of this buffer strip may be greater than 100 feet for reasons such as topography, riparian soils, a windfirm boundary, timber stand boundaries, logging systems requirements, and varying stream channel locations. In addition, certain Class III streams flow directly into or have been identified as influencing Class I streams. These Class III streams have been buffered to the slope break of the channel or to a windfirm boundary to protect water quality. Refer to Appendix J (Unit Design Cards) for the unit-specific stream buffering which is being applied. Application of BMPs and adherence to the law will protect water quality and fish habitat as well as riparian habitat important to other species such as deer, bear, and furbearers.

Wildlife

Mitigation measures to protect wildlife habitat that are built into the design of the alternatives include the location of the harvest units. Harvest units are intentionally located away from important wildlife habitats (to the extent practicable) to reduce effects on wildlife. Beach and estuary fringe habitats are avoided as much as possible. Travel corridors are left untouched (where practicable) to allow undisturbed movement of wildlife.

Other measures considered to mitigate impacts include road closures, hunting restrictions during active logging operations, retention of snags where safe to do so, and scheduling of harvest activities which reduce disturbance to bald eagle nesting and rearing activity. Where excessive alder slash is generated as a result of road construction, openings for wildlife movement will be provided.

Impacts to brown bear from bear-people interactions should be mitigated by informing logging camp residents about brown bear behavior and bear management policies. Incinerators will be used in logging camps for garbage disposal to resolve bear-garbage problems.

Road use will be monitored after timber harvest and appropriate restrictive actions will be taken if unacceptable impacts to wildlife or other resources occur. Fish and wildlife populations and subsistence use will be monitored to determine if and when restrictions of such harvest will occur under mandates of ANILCA Title VIII, Sections 802 and 804.

Subsistence

Because most subsistence use involves harvesting fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities. By placing units and roads away from beach and estuary fringe habitats and away from salmon-bearing streams, mitigation measures were built into each of the alternatives considered in this Final EIS.

Recreation

Effects of timber harvest on views from anchorages and known recreational day-use areas will be reduced by leaving buffers of timber along beaches and inland lakes to reduce direct effects on recreation opportunities.

Trails provide access for family outings.

Comparison of Alternatives

The comparison of alternatives draws together the conclusions from the materials presented throughout the document and provides the results of the analysis in summary form. The following sections provide:

1) A comparison of alternatives by identified issue;

2) A comparison of alternatives by proposed activity; and

3) A comparison of alternatives by environmental consequence.

Chapter 1 lists the issues that are the focus of this Draft EIS. This section compares the alternatives in terms of these issues. The baseline for comparing the alternatives is Alternative A2, the No-Action, No Further Harvest Alternative. Chapter 4 contains the detailed evaluation of the potential effects on forest resources of timber harvest and road construction activities under each alternative.

Comparison of Alternatives by Identified Issue

Issue 1: How do timber harvest and road-building activities affect wildlife habitat?

Two points in time were used to evaluate the extent of potential effects to wildlife habitat. The year 1992 was chosen to represent the current, existing condition. Since it is projected that timber harvest activities would occur in the Southeast Chichagof area between 1993 and 2000, 2000 will be used to determine total impacts to wildlife habitat as a result of the proposed actions.

Table 2-34 displays the acres proposed for harvest in each of the six major wildlife habitats and the percent reduction in habitat from the current condition.

Table 2-34
Wildlife Habitats Proposed for Harvest

	Alternative											
	A1/A2		B		C		D		E		F	
Habitat	Acres Cut	Percent Decline	Acres Cut	Percent Decline	Acres Cut	Percent Decline	Acres Cut	Percent Decline	Acres Cut	Percent Decline	Acres Cut	Percent Decline
Beach Fringe	0	0	0	0	0	0	0	0	0	0	0	0
Estuary Fringe	0	0	20	<1	19	<1	0	0	2	<1	6	<1
Old-growth Forest	0	0	4,191	3	3,292	2	3,818	3	3,668	3	3,304	2
Streamside Riparian	0	0	0	0	0	0	0	0	0	0	0	0
Forest	0	0	4,191	2	3,292	2	3,818	3	3,668	3	3,304	2
Alpine/ Subalpine	0	0	9	<1	41	<1	6	<1	50	<1	50	<1

SOURCE: Anderson 1992.

Note: Since habitats overlap, Acres Cut column does not add up to reflect actual acres planned for harvest by alternative. For example, acres of old growth that occur in the beach fringe are counted in the old-growth habitat, beach fringe habitat, and forested habitat.

A direct effect on wildlife habitats from all action alternatives would be loss of old-growth and change of forest habitat. Impacts to other habitats were greatly reduced through unit and road design prior to alternative formulation. Alternative A2, No Action, would have no effect on wildlife habitats while all action alternatives have similar impacts on each of the habitats. The difference between the action alternatives in impacts on wildlife habitats is negligible. All alternatives would result in impacts consistent with implementation of the current TLMP.

Table 2-35 displays the potential reduction in wildlife habitat capabilities for the 10 key Management Indicator Species (MIS) found in the Southeast Chichagof Project Area, as calculated by GIS computer models. This table displays the pre-APC long-term contract habitat capability and the estimated reduction in this capability after the actions proposed at this time would be implemented (the year 2000). Impacts displayed under Alternative A2 are a result of previous actions in the Project Area. Habitat capability does not necessarily indicate current or future populations, but rather is a means to measure approximate effects.

Knowledge of brown bear behavior would help to mitigate negative bear–people interactions.

Table 2-35
Potential Reduction In Habitat Capability for MIS by year 2000

Habitat Capability	Population Pre-1960	Potential Reduction Alternative A1/A2	B	C	D	E	F
Sitka Black-tailed Deer	8,706	15	17	17	17	17	16
Brown Bear	415	2	3	4	4	4	3
Red Squirrel	202,172	5	7	6	6	6	6
Otter	269	18	19	19	19	19	18
Pine Marten	479	13	15	15	15	15	15
Brown Creeper	4,321	63	64	65	65	65	64
Red-breasted Sapsucker	27,516	8	11	10	11	10	10
Hairy Woodpecker	3,458	26	28	28	29	28	28
Vancouver Canada Goose	579	7	9	8	8	11	11
Bald Eagle	760	18	19	19	19	19	19

SOURCE: Anderson 1992.

Note: Habitat capability is measured as estimated population. Potential reduction indicates total cumulative reduction between 1960 and 2000.

By the year 2000, all of the action alternatives would decrease habitat capabilities less than 10 percent and, in most cases, 2 percent or less. Alternative A2 would maintain the current habitat capabilities for the MIS while all action alternatives would cause similar minor decreases in habitat capability for all MIS.

Issue 2: How would timber harvest and road-building activities affect fish habitat?

The evaluation in Chapter 4 shows that the potential effects on fish habitat and related water quality are minimal for all alternatives. All alternatives meet the requirements and intent of the Clean Water Act. Implementation of proposed fish habitat enhancement projects for each alternative would increase the habitat for fish production. Implementation of the TTRA's requirement to provide a minimum 100-foot buffer on Class I streams and Class II streams flowing directly into Class I streams would effectively mitigate direct stream channel impacts from proposed timber harvest and road construction. Adherence to BMPs outlined in the Soil and Water Conservation Handbook (USDA FSH 2509.22) during the design of units and roads will minimize the potential direct effects to fish habitat as well. Site-specific BMPs were developed and selected to minimize the potential for impact to fish habitat. These site-specific BMPs are noted on the individual Harvest Unit Design and Road Design cards in Appendices J and K.

The Chapter 4 evaluation rates the relative risk of each alternative in terms of producing a mass-wasting event that could directly or indirectly result in an increase in sediment to Class I streams. This rating does not imply that such a mass-wasting event will occur; rather, it ranks the alternatives on the basis of the potential for a mass-wasting event to occur, which may or may not result in an increase in stream sediment. This increased stream sedimentation may result in some loss or impairment of resident and anadromous fish spawning and rearing

habitat. The risk rating is based upon the acreage of harvest units and the mileage of roads that have the greatest potential to produce sediment. These are harvest units and roads that are located on soils with a high hazard rating for mass movement. Table 2-36 displays these factors by alternative. Alternatives A1 and A2 are not displayed as they propose no activities for this project.

Table 2-36
Relative Sediment Delivery Potential to Class I Streams (on High Hazard Soils)

	Alternative				
	B	C	D	E	F
Harvest Units (acres)					
Direct Delivery Potential	308	335	313	382	394
Indirect Delivery Potential	402	301	410	460	474
Roads (miles)					
Direct Delivery Potential	18.4	12.5	15.3	15.0	11.7
Indirect Delivery Potential	6.4	5.1	7.0	5.8	6.1

SOURCE: Paustian and Kelliher 1992.

Using this data, Alternative C would have the lowest risk of accelerated mass-wasting. Alternatives E and F have the higher risks for producing sediment from harvest units, and Alternatives B and D have the higher risk for producing sediment from roads.

Issue 3: What would be the socioeconomic effects of logging and associated development on Southeast Alaska residents?

Table 2-37 summarizes the estimated net stumpage value for each of the alternatives. Both the values and their volumes are estimates based upon current information and not actual appraisal values or cruised timber volumes.

Timber harvest creates job opportunities.

Table 2-37
Summary of Estimated Net Stumpage Values ($/MBF)

Alternative	Estimated[1] Total Volume Harvested (MBF)	Estimated[2] Net Stumpage ($/MBF)	Rank
A1, A2	0	$0	Null
B	137,420	(10)	5
C	111,000	44	1
D	132,040	15	3
E	125,560	9	4
F	104,490	23	2

SOURCE: Lilly 1992.

Note: Negative values are shown in parenthesis ( ).

1 Subject to change based upon results of timber cruise made at time of offering.

2 These values are the result of a midmarket assessment subject to change based upon changes in market value and results of appraisal incorporating normal profit and risk made at time of offering.

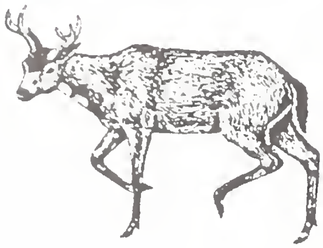
On the basis of estimated net stumpage value, Alternative C would provide the largest return to the U.S Treasury followed by Alternatives F, D, and E; all would be considered economic offerings. As currently designed, Alternative B would not be an economic offering.

Table 2-38 displays the employment (jobs) and personal income (salaries) associated with each alternative. The jobs and salaries listed include those both directly and indirectly dependent on the timber industry. The volume of timber harvested for each alternative results in a level of jobs and salaries associated with that volume. Employment and personal income are based on the Forest Service economic model, IMPLAN.

Table 2-38
Timber Industry Employment and Income

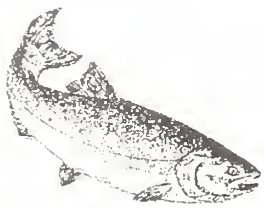
	Alternative					
	A1/A2	B	C	D	E	F
Employment (Jobs)	0	1,513	1,212	1,480	1,334	1,139
Personal Income (Million $)	0	50.5	43.2	53.3	49.2	40.4

SOURCE: Morse 1992.



Alternatives B through F would provide sufficient volume to enable the Forest Service to meet contractual obligations to the APC and assist in maintaining timber-related employment in the region. In these alternatives, the total volume harvested ranges from 104.5 MMBF in Alternative F to 137.4 MMBF in Alternative B. These volumes would be provided to APC in harvest offerings that would meet contract requirements and maintain the volume needed to continue production. As a result, the annual harvest for each of these alternatives would be expected to remain relatively constant, and would not have a significant effect on the timber industry or its dependent employment and income.

Under Alternative A2, the No-Action Alternative, none of the employment described above would be supported by timber harvest activity in the Southeast Chichagof Project Area. If a sufficient volume of timber was not available from other sources within an acceptable time frame, selection of the No-Action Alternative could be expected to cause a significant impact to the economic base of communities dependent on timber harvest and processing by APC. This would have a ripple effect throughout the various economic sectors in Southeast Alaska that both directly and indirectly benefit from the employment with APC. This loss of direct and indirect employment in the timber industry would be expected to result in slower (possibly negative) population growth in some communities. The consequences of Alternative A1/A2 would produce a significant adverse effect on the timber industry and the economic and social environment dependent on that industry.



None of the alternatives is expected to have a significant impact on the commercial fishing, recreation, and tourism industry, or related employment.

Issue 4: How will subsistence uses be affected by proposed timber harvest and road-building activities?

Based on potential direct and cumulative effects of timber harvest, there is a significant possibility of a significant restriction of subsistence use of deer in the Project Area under all alternatives, including the No-Action Alternatives. The proposed alternatives do not present a similar significant possibility of significantly restricting other subsistence uses.

Subsistence hearings were held in Angoon, Haines, Skagway, Sitka, and Tenakee Springs in accordance with ANILCA Section 810. These hearings gave subsistence users an opportunity to testify on their subsistence use within the Project Area and their perceptions of probable impacts to those uses from the proposed alternatives. A summary of the subsistence testimony is included in the Record of Decision. Transcripts of the hearings can be found in Appendix D.

Issue 5: Where would log transfer facilities (LTFs) be located and what would be the environmental effects?

A total of five LTF locations are considered for use in the Project Area. Most of the proposed LTF sites are existing, previously used sites; two are currently active—Corner Bay and False Island. The proposed Oly Creek LTF is the only new site. It is located west of the previously used LTF site as recommended by the National Marine Fisheries and U.S. Fish and Wildlife Service dive reports. Table 2-39 displays all possible LTF locations, in which alternatives they would occur, and whether they are located in the estuary or marine system. Table 2-40 displays the number of LTFs used or developed, the total acreage, and percent of estuarine and marine habitat directly impacted under each alternative.

Table 2-39
Log Transfer Facilities Required

VCU	LTF Name	Alternative A1/A2	B	C	D	E	F	System Affected Estuary	Marine
230	Inbetween			●		●	●	●	●
233	Crab Bay			●		●		●	●
236	Corner Bay			●	●	●	●		●
245	False Island		●	●			●		●
245	Oly Creek				●	●	●	●	●
	Total LTFs	0	1	4	2	4	4		

SOURCE: Kosak and Allio 1992.

Table 2-40
Number of LTFs Developed and Acreage of Direct Impact to Estuarine and Marine Systems

Alternative	LTFs Developed	Estuarine System Acres	% of Total	Marine System Acres	% of Total
A1/A2	0	0.0	0	0.0	0
B	1	0.0	0	0.9	<1
C	4	1.0	<1	2.5	<1
D	2	0.3	<1	1.7	<1
E	4	1.3	<1	2.6	<1
F	4	0.8	<1	3.5	<1

SOURCE: Kosak and Allio 1992.
<1 = Less than one percent

LTFs would have direct effects on the marine and estuarine environment. These effects are assumed to occur from development and use of LTFs and are limited to the intertidal area impacted by rock fill and either the intertidal or subtidal areas potentially impacted by accumulation of bark debris. Loss of habitat at each of the LTF sites represents less than one percent of total estuarine system and is considered to be a very minor effect.

Alternative F impacts the most marine system (3.5 acres) followed by Alternative E (2.6 acres), Alternative C and D (1.7 acres) and Alternative B (0.9 acres). The loss of habitat from any of the alternatives is less than one percent and is considered to be a very minor effect.

For all action alternatives, the area of potential effect at the LTF sites is less than 1 percent of the marine habitat in the Southeast Chichagof Project Area. Since all species identified along the subtidal survey transects are common throughout Southeast Alaska, it is concluded that there would not be a significant impact to the marine environment from constructing (or continuing to use) LTFs at the proposed sites.

Issue 6: What are the transportation system needs in the Southeast Chichagof Project Area which will permit the harvest of timber, and what effect does vehicular travel have on forest resources?

Table 2-41 summarizes the mileage of the proposed transportation system for each of the alternatives. Displayed are: 1) miles of roads proposed for construction that are to be permanent additions to the forest road system (specified roads); 2) miles of existing forest system roads to be reconstructed; and 3) miles of temporary roads that would be used with this project and then closed after use. The development and use of the forest transportation system has the potential to provide a source of sediment to streams and to increase access.

Road construction in the Tongass.

Table 2-41
Miles of Road

	Alternative				
	B	C	D	E	F
Specified Road Construction	67.1	25.5	61.4	54.1	36.8
Specified Road Reconstruction	13.5	23.2	23.8	14.5	21.8
Temporary Road Construction	29.1	15.6	18.0	21.0	20.1
Total	109.7	64.3	103.2	89.6	78.7

SOURCE: Kosak and Allio 1992.

Alternative B proposes the most road construction and reconstruction, followed by Alternatives D, E, F, and C, in that order. Alternatives B, D, and E develop more new specified roads, whereas Alternatives C and F concentrate harvest in previously roaded areas. Alternative D uses the road systems in previously harvested areas as do Alternatives C and F, but also would further develop the Project Area's transportation system. The degree of impact of the transportation system proposed for each alternative to forest resources is directly proportional to the mileage of road constructed and the mileage managed for continuing use. After timber harvest, roads that are closed and allowed to revegetate (temporary roads) have the least impact on forest resources.

Road Management Objectives (RMOs) were developed to address the potential effects of the development and use of roads upon soils, water, wildlife, subsistence, and fish resources. The RMOs are summarized in Volume II, Appendix I.

Issue 7: How would timber harvest and road construction activities affect recreation and scenic resources?

Recreation

Under all alternatives, the Southeast Chichagof Project Area has potential to provide a wide range of recreation opportunities, activities, settings, and experiences. The change in recreation setting, because of timber harvest and/or road construction activities, may affect the recreational experience and, therefore, overall satisfaction of the forest visitor. Visitors seeking a Primitive or Semiprimitive recreational experience may not be satisfied in an area with active timber management activities. On the other hand, visitors who do not require a natural setting for their recreation activities may appreciate the opportunity to use a road for access to the interior of the Project Area.

Kook Lake recreation cabin

Table 2-42 displays the percent of the various Recreation Opportunity Spectrum (ROS) classes in the Project Area following implementation of each alternative. Since VCUs 228, 229, 235, and 237 are classified LUD 11, no timber harvest or road construction is proposed under any alternative in these VCUs. Because of this, there would be no change to the ROS classes for these VCUs.

Table 2-42
Percent of Project Area in Each ROS Class Following Alternative Implementation

	Alternative					
ROS Class	A1/A2	B	C	D	E	F
Primitive (PRIM)	16	12	16	10	15	15
Semiprimitive Nonmotorized (SPNM)	56	55	53	57	52	54
Semiprimitive Motorized (SPM)	8	6	7	7	7	7
Roaded Natural (RN)	1	1	1	1	1	1
Roaded Modified (RM)	19	26	23	25	25	23
Total	100	100	100	100	100	100

SOURCE: Nelson 1992.

Note: Although nine VCUs (227-229, 235, 237-238, 242-244) will not be affected by any alternative, their ROS acres are included in the above totals because they lie within the Project Area boundaries.

Alternatives A1 and A2 would result in no change to the current ROS classifications. They provide a baseline for comparing the effects of the alternatives on the recreation resource. Although the Project Area is predominantly undeveloped, many areas have been modified through road construction and timber harvest activities.

Table 4-42 indicates that the greatest changes from the existing situation occur in Alternatives B, D, and E. In these alternatives, the acres of Primitive and Semiprimitive Nonmotorized settings will be reduced, while the Roaded Modified acres all are increased. The increase in the Roaded Modified ROS acres are 20,620 acres for Alternative B, 12,106 acres for Alternative C, 18,707 acres for Alternative D, 18,658 acres for Alternative E, ad 14,483 acres for Alternative F. These changes will have a negative effect on those individuals seeking nonmotorized recreational experience, and will have a positive impact on those desiring a more modified setting for their activities.

Alternatives B, D, and E harvest new areas within the Project Area as well as increase the size of the existing developed areas with additional road construction and timber harvest. There will be a significant increase in the development of the Project Area, especially in the shoreline and associated upland areas where most recreation takes place.

Alternatives C and F, for the most part, would limit activities to areas of existing development with some additional road construction and timber harvest, although each alternative utilizes a different approach. This also would be an increase in development; however, it is less than for Alternatives B, D, and E. See Chapter 4, *Environmental Consequences*, for a more detailed discussion of the recreation resource.

Scenic Quality

Table 2-43 displays the VQLs resulting from the implementation of the Project's alternatives. A VQL for an alternative that results in an increase in modification or maximum modification acreage indicates a negative effect on the visual resource.

Table 2-43
Visual Quality Levels Resulting from the Implementation of the Southeast Chichagof Project Alternatives (in acres)

Visual Quality Levels	Alternative A1/A2	B	C	D	E	F
Retention	5,954	5,954	5,954	5,954	5,954	5,954
Partial Retention	86,945	86,261	85,954	85,903	86,121	86,178
Modification	71,099	71,569	71,892	72,022	71,923	71,866
Maximum Modification	32,870	33,084	33,068	32,989	32,870	32,870
Total	196,868	196,868	196,868	196,868	196,868	196,868

SOURCE: Monaco 1991.

The increase of Maximum Modification and Modification acreage with the corresponding decrease in Partial Retention acreage represents a slight to moderate impact to the visual resource within the Project Area for all action alternatives. The increase in Maximum Modification and Modification acreages for all action alternatives is 1 percent or less. Alternative D displays the greatest increase in these acres, followed by Alternatives C, E, F, and B. However, each action alternative concentrates or disperses activities in different areas within the Project Area; thus, the impact to specific viewsheds would vary. With Alternative A1/A2, the existing visual condition remains unchanged and would range from natural appearing in the Broad Island area to heavily altered in the Corner Bay, Kook Lake, Sitkoh Bay, and False Island areas.

Alternative B would allow timber harvest and road building to be concentrated in the northwest portion of the Project Area in six VCUs. Visual impacts would range from moderately altered to heavily altered.

Alternative C enters seven VCUs and concentrates activities in previously affected areas. Visual impacts in the Project Area range from moderately to extremely altered, with some areas not being affected at all.

Alternative D disperses timber harvest and road building over ten VCUs, more than the other action alternatives. Visual impacts range from slightly altered to extremely altered within the Project Area, depending on the specific VCU.

Alternative E proposes activities in nine VCUs away from salt water and lakes. The resulting visual impact, depending on the specific VCU, would range from moderately to extremely altered.

Alternative F proposes activities in seven VCUs that would slightly to extremely alter the visual resource in the Project Area. Timber harvest and road building is concentrated in previously harvested VCUs mostly away from salt water and lakes.

Comparison of Alterntaives by Proposed Activity

Table 2-44 presents a summary comparison of the proposed activities for each of the alternatives. It provides a brief comparison of timber harvested by volume an by harvest method, miles of road, number of LTFs required, an d estimated index value. This table summarizes more detailed information found in Chapter 4, *Evironmental Consequences*.

Table 2-44
Comparison of Alternatives

Proposed Activity	Alternative A1/A2	B	C	D	E	F
Timber						
Total Harvest (MMBF)	0	137.4	111.0	132.0	125.6	104.5
No. of Harvest Units	0	117	83	83	97	92
Average Unit Size (acres)	0	36	40	46	38	36
Logging system (acres by method)						
Shovel	0	78	16	73	22	0
Highlead	0	253	156	217	192	91
Slackline	0	1,064	604	736	642	608
Running Skyline	0	2,387	1,143	1,712	1,672	1,445
Live Skyline	0	409	315	378	187	235
Helicopter	0	0	1,058	702	953	925
Total	0	4,191	3,292	3,818	3,668	3,304
Roads (miles)						
New Construction	0	67	26	63	54	37
Reconstruction	0	13	23	24	14	22
Temporary	0	29	14	16	21	19
Total miles	0	109	63	103	89	78
MMBF/mi.	0	2.0	4.4	2.2	2.3	2.8
Facilities						
LTFs	0	1	4	2	3	4
Logging camps	0	1	2	2	2	2

Comparison of Alternatives by Environmental Consequences

Table 2-45 displays a summary comparison of the anticipated consequences of each of the alternatives over the entire Project Area. It is presented by resource as in Chapter 3 and 4. Statements of significance are included to qualify the projected change under each alternative. The statements of significance are based on the amount of change between current conditions and conditions which are the result of the proposed actions. The criteria used for significance were none (no change), slight (<1 to 5 percent change), minor (6 to 20 percent change), moderate (21 to 30 percent change), and substantial (greater that 30 percent change).

Table 2-45
Comparison of Environmental Consequences of Alternatives

Environmental Consequence	Alternative A1/A2	B	C	D	E	F
Vegetation (Successional Stages)						
% Seedling/sapling	3	6	5	6	6	5
% Pole/young sawtimber	12	12	12	12	12	12
% Mature sawtimber	0	0	0	0	0	0
% Old-growth	85	82	83	83	82	83
% Significance	None	Slight	Slight	Slight	Slight	Slight
Floodplains						
% of total affected	0	0	0	0	0	0
Significance	None	None	None	None	None	None
Wetlands						
% of total affected	0	3	2	3	6	5
Significance	None	Slight	Slight	Slight	Slight	Slight
Wildlife Habitats*						
% of total acres	0	3	2	3	3	2
Significance	Slight	Slight	Slight	Slight	Slight	Slight
Beach Fringe	0	0	0	0	0	0
Significance	None	None	None	None	None	None
Estuary Fringe	0	<1	<1	0	<1	0
Significance	None	Slight	Slight	Slight	Slight	Slight
Old-growth Forest	0	3	2	3	3	2
Significance	None	Slight	Slight	Slight	Slight	Slight
Riparian	0	0	0	0	0	0
Significance	None	None	None	None	None	None
Forest	0	2	2	3	3	2
Significance	None	Slight	Slight	Slight	Slight	Slight

Table 2-45 (continued)

Comparison of Environmental Consequences of Alternatives

Environmental Consequence	Alternative A1/A2	B	C	D	E	F
Alpine/Subalpine	0	<1	<1	<1	<1	<1
Significance	None	Slight	Slight	Slight	Slight	Slight
Watershed and Fish						
% of road miles with sediment delivery potential to Class I streams	0	22	26	18	21	20
Significance	None	Moderate	Moderate	Minor	Moderate	Minor
% of harvest areas with sediment delivery potential to Class I streams	0	7.1	9.8	7.9	9.3	11.4
Significance	None	Minor	Minor	Minor	Minor	Minor
Recreation						
% decrease in acres of Primitive and Semiprimitive Nonmotorized ROS	0	8	5	7	8	6
Significance	None	Minor	Slight	Minor	Minor	Minor
Visual Quality						
% increase in acres of modification and maximum modification VQOs	0	1	1	1	1	1
Significance	None	Slight	Slight	Slight	Slight	Slight
Marine						
% of total estuarine habitat affected	0	0	<1	<1	<1	<1
Significance	None	Slight	Slight	Slight	Slight	Slight
% of total marine habitat affected	0	0	0	0	0	0
Significance	None	None	None	None	None	None
Land Status						
Acres within a selection area	0	0	0	0	0	0
Roads in selection area	yes	no	yes	yes	yes	yes

Table 2-45 (continued)
Comparison of Environmental Consequences of Alternatives

Environmental Consequence	Alternative A1/A2	B	C	D	E	F
Cultural						
Impacts to known cultural resources	0	0	0	0	0	0
Significance	None	None	None	None	None	None
Economic and Social						
Estimated Net Value ($/MB)	0	-10	+44	+15	+9	+23
Employment (no. of jobs)	0	1,496	1,168	1,435	1,356	1,122
Income (in MM$)	0	52.66	41.31	50.54	47.66	39.55
Payment to state (in MM$)	0	2.10	2.41	3.05	2.65	2.34
Subsistence						
Significant possibility of a significant restriction						
Deer	yes	yes	yes	yes	yes	yes
Furbearers	no	no	no	no	no	no
Salmon	no	no	no	no	no	no
Other finfish	no	no	no	no	no	no
Waterfowl	no	no	no	no	no	no
Marine mammals	no	no	no	no	no	no
Brown bear	no	no	no	no	no	no

* The significance of change in wildlife habitats also reflect the change in habitat capabilities for MIS.

Monitoring

Monitoring is designed to determine if the resource management objectives of the Southeast Chichagof Final EIS have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring were recognized in the development of this monitoring plan and are described below. Regardless of which alternative is selected, monitoring activities will be conducted over the course of the project to determine if standards and guidelines for the project area have been met.

Implementation Monitoring

Implementation monitoring assesses whether the project was implemented as designed and whether or not it complies with the TLMP. Planning for implementation monitoring began with the design of this timber sale. Specialists used on-the-ground inventories, computer inventories, and aerial photographs to prepare documents called unit cards for each harvest unit in the timber sale. Cards were also prepared for each segment of road. Resource specialists wrote their concerns on the cards and then described how the concerns could be addressed in the design of each unit and road segment. These documents will be the basis for determining whether recommendations were implemented for various aspects of this timber sale.

Monitoring is performed to determine if resource management objectives have been met.

Implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors ensure that the prescriptions contained on the unit and road cards are implemented. Implementation monitoring of soil and water resources will largely consist of monitoring BMPs and Aquatic Habitat Management Unit (AHMU) prescriptions. BMPs as defined in the Region 10 Soil and Water Conservation Handbook (USDA FSH 2509.22) are procedures designed to ensure protection of soil and water resources. Watershed specialists will coordinate annual IDT reviews of BMP implementation in the Project Area.

Effectiveness Monitoring

Effectiveness monitoring seeks answers to questions about the effectiveness of design features or mitigation measures in protecting natural resources and their beneficial uses. These plans will define data collection analysis and reporting requirements for each effectiveness monitoring activity. Implementation and effectiveness monitoring results will be combined into an annual report to be submitted to the Alaska Department of Environmental Conservation (ADEC).

One major objective of this strategy is to do initial implementation and effectiveness monitoring of Forest Service BMPs by December 1992. The Chatham Area is currently developing a BMP monitoring strategy and action plan to achieve this objective. BMP monitoring in the Southeast Chichagof Project Area will follow the general guidelines outlined in this action plan. BMPs to be monitored at a specific site are determined through a review of unit/road cards, fish habitat reports, and other appropriate documentation.

Validation Monitoring

Validation monitoring is conducted to determine if the assumptions or models used in planning are correct. It is usually carried out at the Forest level in conjunction with research and is identified in the Forest or Regional planning process. As such, no validation monitoring is identified in this Final EIS.

Implementation Monitoring Activities

The following is a description of the implementation monitoring activities expected to take place in conjunction with the Southeast Chichagof Project.

Timber

Timber Unit Layout

Objective:	To minimize the effects of timber harvest on other natural resources.
Desired result:	Unit card design specifications allow timber harvest to "lay lightly" on the land.
Measurement:	Sale layout employees will follow guidance on the cards. Specialists from other resources will assist in unit layout where indicated on the unit cards. At a minimum, 20 percent of the units implemented each year will be sampled for compliance with unit card design. (BMPs 13.3, 13.8)
Threshold:	Sample of units should be within 10 percent of the parameters stated on the unit card.
Corrective action:	If needed, determine why unit was not laid out as designed. Document changes if they benefit the environment, change unit layout to match the design if effects are within BMPs.
Responsible staff:	Sitka Ranger District (SRD) sale layout employees.
Record of results:	"As laid out" unit cards.
Annual cost:	Ongoing business. No additional funding needed.
Personnel needs:	None.

Timber Unit Yarding

Objective:	To ensure yarding minimizes the potential risk of soil loss on units with inclusions of high hazard soils.
Desired result:	Use of log suspension and yarding away from V-notches within a unit will protect high hazard soils from erosion.
Measurement:	Sale administrator will ensure log suspension occurs on designated units. Specialists may spot check up to 20 percent of the units with high hazard soils for compliance with BMPs. (BMPs 13.2, 13.4, 13.5, 13.9, 13.12, and 13.15)
Threshold:	Exposure of more than 10 percent of the affected area to bare mineral soil.
Corrective action:	Stop implementation and resolve between sale administrator, soil scientist, and timber sale operator. If not resolvable at the field level, elevate to District Ranger.
Responsible staff:	SRD sale administration employees and soil scientist.
Record of results:	Daily diaries prepared by engineering representatives and sale administrators. Soil scientist memos documenting field verification activities.
Annual cost:	Ongoing work, no additional funding needed.
Personnel needs:	None.

Roads

Road Location and Design

Objective:	To ensure that roads are located as specified in the Final EIS.
Desired result:	Road survey and design standards capture the stated intent in the Final EIS, which is to minimize impacts to soil and water resources. (BMPs 14.2, 14.5, 14.6, 14.10, 14.12, 14.14)
Measurement:	Engineering representatives and road designers will review roads during contract preparation and field design staking. Final plan-in-hand review will ensure compliance with RMOs.
Threshold:	Less than 10 percent variation between plans and field implementation.
Corrective action:	Correct designs as needed in the pre-implementation stages. During plan-in-hand review, implement changes specified in design if not in compliance.
Responsible staff:	Engineering staff, District Ranger approval.
Record of results:	Results recorded on road survey and designs. Internal memos noting plan-in-hand review.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Slope Stabilization

Objective:	To determine if road designs and construction have met the intent in the Final EIS to reduce risk of mass failure.
Desired result:	To design roads which minimize the potential for road-related mass failures. (BMPs 14.7, 14.8, 14.12, 14.20)
Measurement:	Engineering representatives and road designers will review roads during contract operations, with assistance from the soil scientist as needed. Final plan-in-hand review will ensure compliance with road design standards.
Threshold:	Less than 10 percent variation between plans and implementation.
Corrective action:	Correct designs as needed in the pre-implementation stages. During plan-in-hand review, have contractor implement changes specified in design if not in compliance.

Responsible staff:	District Ranger final approval.
Record of results:	Results recorded on road survey and designs, and on memo noting plan-in-hand review, or findings of soils scientist.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Erosion Control Measures

Objective:	To minimize erosion of and sedimentation from timber harvest and road construction and maintenance activities.
Desired result:	Road survey and design standards capture the stated intent in the Final EIS, which is to minimize the risk of soil erosion and sedimentation to streams. (BMPs 13.13, 13.16, 13.17, 14.5, 14.11, 14.16, 14.17, 14.18, 14.20, 14.22, and 14.26)
Measurement:	Engineering representatives and road designers will review roads during and following contract operations, with assistance from a soil scientist when needed. Periodic survey following close of operations will be scheduled by the personnel responsible for road maintenance.
Threshold:	Erosion control methods in place 90 percent of the time.
Corrective action:	Correct designs as needed in the pre-implementation stages. During sale operations, have contractor implement changes specified by designs if not in compliance.
Responsible staff:	Engineering staff and soils staff (post-harvest)
Record of results:	Results recorded on daily diaries prepared by the engineering representative. Following sale operations, results recorded by a soil scientist in followup reviews.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Log Transfer Facilities

Petroleum spills

Objective:	To ensure petroleum spills do not impact the marine waters.
Desired result:	Facility design and implementation will prevent fuel spillage from entering nearby waters.
Measurement:	Routine observation by LTF operator for an oil sheen as required in the EPA 402 permit. (BMPs 12.8, 12.16, and 14.4)
Threshold:	Evidence of oil sheen on surface of water.
Corrective action:	Suspend operations and remedy the situation.
Responsible staff:	Sale administrator and field engineer.
Record of results:	Daily diaries of either field inspector.
Annual cost:	Ongoing business; no additional funding needed.
FTE needs:	None.

LTF Removal

Objective:	To minimize permanent effects of a LTF on the marine environment.
Desired result:	Apply mitigation measures by removing temporary LTF structures at the end of the operations. (Other measures may be stipulated in LTF permits granted after the Record of Decision.)
Measurement:	Enforcement of specifications in contract at the termination of contract operations.
Threshold:	Removal of LTF is incomplete.
Corrective action:	Withhold release of performance bond until facility mitigation is in compliance with contract specifications.

Responsible staff:	Sale administrator and engineering representative.
Record of results:	Letter authorizing movement of sale operations.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Water Quality and Fish Habitat

Stream Buffers for Tongass Timber Reform Act

Objective:	To ensure compliance with TTRA.
Desired result:	Ensure the minimum 100-foot buffer is maintained to protect water quality and stream habitat for all Class I streams and Class II streams which flow directly into Class I streams which fall in proximity to a timber harvest unit. (BMPs 12.6, 12.7, and 13.15)
Measurement:	Spot check 20 percent of all units within proximity to anadromous fish streams for compliance with TTRA. Field verification would occur prior to timber harvest.
Threshold:	Minimum 100-foot buffer.
Corrective action:	Prevent implementation until a minimum buffer width can be ensured.
Responsible staff:	SRD timber layout and sale administration employees.
Record of results:	Sale layout cards for units and daily diaries for sale administrators.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Stream Buffers for streams not covered by TTRA

Objective:	To ensure protection of water quality streams.
Desired result:	For all Class II and Class III streams, manage according to the AHMU handbook (FSH 2609.22). (BMPs 12.6, 12.7 and 13.15)
Measurement:	Specialists will spot check up to 20 percent of the units offered for sale each year. Where units cross these types of channels, log suspension is required in the timber sale clauses and yarding occurs away from the V-notches to minimize soil disturbance.
Threshold:	Plus or minus 10 percent of all units checked will stop at the slope break above Class II and Class III streams.
Corrective action:	Stop implementation and resolve between layout, sale administrator, and timber sale operator. If not resolvable at the field level, elevate to District Ranger.
Responsible staff:	SRD timber layout and sale administration employees.
Record of results:	As-laid-out cards for units prepared by layout employees, or daily diaries prepared by engineering representatives and sale administrators.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Wildlife

Eagle Nesting Habitat

Objective:	To ensure Forest Service maintains the minimum 330-foot buffer around eagle nest locations or to maintain the least impact on the nest locations where a variance has been obtained.
Desired result:	Protection of eagle nest locations.
Measurement:	During sale implementation activities, observe nest use on nests close to the logging camps and major road crossings. This is especially critical at locations where variances to the 330-foot minimum buffer were negotiated.

Threshold:	Management activities encroach on the 330-foot minimum buffer, or on trees where Forest Service has variances, causing eagle nesting to cease.
Corrective action:	If it appears eagle nesting activity is disrupted because of management activities, consult with the ADF&G and U.S. Fish and Wildlife Service (USFWS) to resolve potential problem.
Responsible staff:	Sale administrator and wildlife specialist.
Record of results:	Sale administrator may record eagle use on the daily diary forms. Specialist doing periodic checks will be responsible to prepare short memo recording findings at nest sites.
Annual cost:	Ongoing activity for sale administration. Site visits by wildlife specialists would be $1,000 per year during active logging operations.
FTE needs:	None.

Beach Fringe, Estuary Fringe and Riparian Habitat

Objective:	Ensure harvesting the units described as being in proximity to beach or estuary fringe habitat is avoided. This would also ensure that areas mentioned as being intentionally left for travel corridors are protected.
Desired result:	To avoid the loss of wildlife habitat, other than that evaluated as part of the effects from the preferred alternative.
Measurement:	Unit cards identify the location of the unit and also note whether or not the unit is adjacent to a protected travel corridor, estuary, or beach fringe. When so noted, these units must not be enlarged in a manner that would adversely affect these wildlife features. Twenty percent of units laid out each year will be spot checked for conformance with unit card design guides.
Threshold:	More than 10 percent of the units spot checked deviate from wildlife concerns stated on cards.
Corrective action:	If, for some reason, the landing or boundary locations are not feasible, the layout employee will contact a wildlife specialist and resolve desired changes at the time of layout. If mutual resolution is not attainable, elevate to the District Ranger.
Responsible staff:	Sitka Ranger District timber sale layout employees.
Record of results:	"As-laid-out" unit cards, as part of the presale files.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Steller Sea Lion

Objective:	To provide protection to TES species which may be located in the Project Area.
Desired result:	Observe known marine mammal haulouts in Tenakee Inlet, Peril Strait, and along the west boundary of Chatham Strait for disturbance to steller sea lions.
Measurement:	Visual observation of marine mammal use of the two known haulouts.
Threshold:	Evidence that marine mammal use the haulouts less frequently.
Corrective action:	Consult with ADF&G, USFWS, and National Marine Fisheries Service (NMFS) for resolution if a conflict becomes apparent.
Responsible staff:	Sale administration employees.
Record of results:	Daily diaries used for contract administration. If a conflict arises, normal correspondence between agencies would record the conflict resolution.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Sea lion rookery

Cultural Resources

Protection of Cultural Resources

Objective:	To ensure cultural resources are protected.
Desired result:	Resolution of any conflicts between protection of cultural resources and timber harvest and road construction activities to meet the National Historic Preservation Act as amended.
Measurement:	Ensure that cultural resources identified prior to any activities are protected. Any cultural resources discovered as a result of harvest or road building activities would be mitigated.
Threshold:	Evidence of cultural artifacts discovered during operations.
Corrective action:	Cultural resource specialist will ensure known sites are protected prior to implementation of any land-disturbing activities. Future discoveries would result in suspension of activities until mitigation measures are designated jointly by cultural resources staff, State Historic Preservation Officer, and the Advisory Council on Historic Preservation.
Responsible staff:	Sale layout employees, engineering and road design employees, and field inspectors of timber sale operations. Cultural resource specialist is available for field inspection as needed.
Record of results:	Results of any new discovery will be recorded in the daily diary by field inspectors. Cultural resource specialist will be required to develop and maintain appropriate records for all new sites discovered.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Effectiveness Monitoring Activities

The following is a description of the effectiveness monitoring activities expected to take place in conjunction with the Southeast Chichagof Project.

Timber

Proportion of Timber Harvest

Objective:	To ensure proportion of Volume Classes 6 and 7 can be met by the end of the APC contract for each Management Area (MA).
Desired result:	MAs in proportion in compliance with TTRA.
Measurement:	Calculate proportion of Volume Class 6 and Volume Class 7 acres harvested based on actual unit location. Compare actual unit location to the archived TIMTYP data layer for each MA (as of 11-28-90).
Evaluation:	Determine if proportion of harvest is in compliance with TTRA.
Responsible staff:	Timber management staff.
Record of results:	Results documented in a short report to Forest Supervisor.
Annual cost:	$500.
Personnel needs:	None.

Timber Restocking

Objective:	To ensure restocking occurs within minimum time frames stated in NFMA.
Desired result:	Adequately restocked timber stands.
Measurement:	Stocking surveys at the first, third or fourth year.
Evaluation:	Determination that stocking is adequate. Corrective action (i.e., planting) if natural regeneration is inadequate.
Responsible staff:	Sitka Ranger District staff.
Record of results:	Annual restocking report. (NFMA)
Annual cost:	Ongoing business; no additional funding needed.
FTE needs:	None.

Precommercial thinning

Objective:	To ensure timber growth on high productive sites is managed for future fiber production.
Desired result:	On high site index sites, have stand thinned at 15 to 20 years of age.
Measurement:	Surveys done of future thinning stands at 10 to 12 years of age to identify and program future thinning activities.
Evaluation:	Determine and document findings of surveys at 10 to 12 years. Prioritize and program the best stands for thinning at 15 to 20 years.
Responsible staff:	Sitka Ranger District employees.
Record of results:	Annual report of overall thinning and precommercial thinning to Supervisor's Office.
Annual cost:	Ongoing business; no additional funding needed.
Personnel needs:	None.

Roads

Road Use Post-sale

Objective:	To determine if RMOs for post-sale use are reflected by actual use.
Desired result:	Use of road systems post-harvest conform to expected use and the effects on resources are commensurate or less than expected.
Measurement:	Random visits to beach heads during May through November.

Evaluation:	Determine if use is occurring, if RMOs being met, and if vehicles are honoring road closures.
Responsible staff:	District timber staff, with assistance from recreation specialist as needed.
Record of results:	Memo documenting the findings of the periodic visits completed after each visit.
Annual cost:	$2,500.
Personnel needs:	0.1 FTE.

Log Transfer Facilities

Bark Accumulation

Objective:	To minimize overall effect on the marine environment from transfer of logs to salt water.
Desired result:	Ensure bark accumulation below active LTFs is less than 10 cm in depth and 1 acre extent thresholds in the Alaska Timber Task Force construction guidelines.
Measurement:	Diving and sampling transects as required by EPA NPDES permit.
Evaluation:	Evaluate dive results in light of all the Alaska Timber Task Force guidelines.
Responsible staff:	Sale administrators during sale operations, District Fish and Wildlife (F&W) staff post-harvest testing.
Record of results:	Dive records and memo analyzing dive results. Possible recommendation for future design and use of LTFs.
Annual cost:	$10,000 every other year.
Personnel needs:	None.

Water quality upstream may affect fish habitat downstream.

Water Quality and Fish Habitat

An effectiveness monitoring program is being developed on a Forest-wide basis in consultation with the State of Alaska. Once developed, it will be applied to the Southeast Chichagof Project Area.

Stream Buffers for Windfirmness

Objective:	To determine if buffers left for protection of stream habitat and water quality were effective and remain windfirm.
Desired result:	Buffers standing, as planned during lay out and implementation.
Measurement:	Periodically spot check buffers following harvest for width and condition using field transects and photogrammetry.
Evaluation:	Determine if buffers are largely intact and within 10 percent of prescribed width. Note recommendations for future buffer design to improve protection of habitat and water quality.
Responsible staff:	District F&W staffs.
Record of results:	Note findings and recommendations in a memo.
Annual cost:	$2,000.
Personnel needs:	None.

Stream Crossing Structures

Objective:	To determine if stream-crossing structures permit the passage of fish on Class I streams and maintain water quality.
Desired result:	Fish passage occurs and design of crossing structure is effective.
Measurement:	For all Class I stream crossings, check for presence of fish above and below the site and inspect the placement of the structure. This should be done during operations and post-harvest.
Evaluation:	Evaluate effectiveness of stream-crossing structure. Note recommendations for improving installation or maintenance of said structure.
Responsible staff:	District fisheries staff and engineering staff.
Record of results:	Note findings of site visits and recommendations in a memo.
Annual cost:	$2,500.
Personnel needs:	0.1 FTE.

Wildlife

Sitka Black-tailed Deer

Objective:	To determine if harvest levels change because of timber harvest operations.
Desired result:	Harvest levels remain at the same level, assuming there is no other major changes in populations (i.e. severe winter kill).
Measurement:	Joint analysis of deer harvest ticket data by ADF&G and Forest Service wildlife specialists.
Evaluation:	If there is apparent deviation from past harvests, assess known factors and determine if it can be correlated to timber harvest operations, or if other factors might be equally responsible (weather, season changes, etc).
Responsible staff:	District wildlife staff and ADF&G biologists.
Record of results:	Prepare a brief report from both agencies.
Annual cost:	$3,000.
Personnel needs:	None.

Brown Bear

Objective:	To keep camps clean and educate camp residents to minimize the risk of human-bear encounters.
Desired result:	Defense-of-life and property bear kills at a minimal level.
Measurement:	Review hunting, defense of life kill records and observe camp sanitation and compliance with incineration guidelines.
Evaluation:	Report yearly on total 'defense of life and property' bear kills by ADF&G biologist.
Responsible staff:	ADF&G and District wildlife staff.
Record of results:	Short report prepared by ADF&G, or report prepared by wildlife staff based on ADF&G information.
Annual cost:	$500.
Personnel needs:	None.

Cultural resources need to be protected from vandalism.

Cultural Resources

Prevention of Vandalism

Objective:	To protect known sites and any newly discovered cultural locations from vandalism.
Desired result:	Protection of cultural resource locations which occur within the Project Area from vandalism.
Measurement:	Periodic visits to known sites to ensure disturbance has not occurred.
Evaluation:	Discovery of disturbance would resulting notification of the Forest Service archaeologist and appropriate law enforcement personnel.
Responsible staff:	Sale administrators, engineering representatives, and cultural resource specialists.
Record of results:	Normally none, unless a violation occurs.
Annual cost:	$3,000.
Personnel Needs	None.

Chapter 3

Affected Environment

CHAPTER 3

AFFECTED ENVIRONMENT

Introduction and VCU Descriptions

This chapter provides information concerning the existing environment of the Southeast VCU Chichagof Project Area. Included are discussions regarding timber, vegetation, floodplains and wetlands, soils, water and fish, marine environment, wildlife, cultural resources, socioeconomics, subsistence, log transfer facilities, roads, recreation, visuals, and lands and minerals. The Southeast Chichagof Project Area contains a total of 288,301 acres. It encompasses 20 Value Comparison Units (VCUs). A brief description of each VCU is provided below.

VCU 227 (Hub Station)

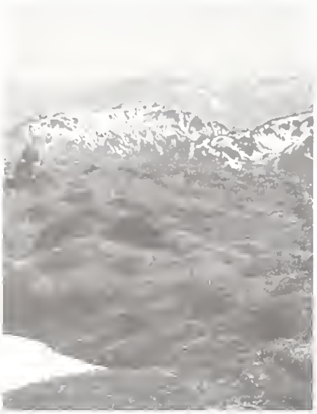
This VCU is located along Tenakee Inlet at the northwestern end of the Project Area. It encompasses the broken mountain slopes facing Tenakee Inlet between Long Bay and the tidal flats at the mouth of Big Goose Creek. The VCU contains 3,829 acres and approximately 6.8 miles of shoreline. VCU 227 was assigned a LUD IV designation in the Tongass Land Management Plan (TLMP). There has been no timber harvest in this VCU.

VCU 228 (Long Bay)

This VCU is located along Tenakee Inlet in the northwestern part of the Project Area. It includes the land surrounding Long Bay and the watersheds to the west that drain into Long Bay. The VCU contains a total of 18,629 acres and has approximately 10.0 miles of shoreline. Over 40 percent of the VCU lies within the alpine and subalpine zones in the mountains surrounding the western end of the VCU. VCU 228 was assigned a LUD II designation in the TLMP. Road construction and timber harvests generally are excluded from LUD II areas. There has been no timber harvest in this VCU.

VCU 229 (Seal Bay)

This VCU is located along Tenakee Inlet in the northwestern part of the Project Area. It contains 22,560 acres and approximately 15.8 miles of shoreline. It encompasses the watersheds that surround Seal Bay; most of the acreage lies southwest of the bay. Over 40 percent of the VCU lies within the alpine and subalpine zones in the mountains to the west and south of Seal Bay. VCU 229 was assigned a LUD II designation in TLMP. Approximately 305 acres of timber were harvested from this VCU during the 1970s (prior to the TLMP). All roads constructed in this VCU have revegetated and are no longer classified as roads on the National Forest transportation system.



VCU 231 contains high–elevation, nonforested alpine soils such as pictured above

VCU 230 (Beth Station - locally known as Inbetween)

This VCU is located along Tenakee Inlet in the northwestern part of the Project Area. It includes the broken mountain slopes and small watersheds facing Tenakee Inlet between Seal Bay and Saltery Bay. The VCU contains 9,396 acres and approximately 7.6 miles of shoreline. VCU 230 was assigned a LUD IV designation in the TLMP. As part of the APC contract, 48 acres were A-frame logged from the beach in the 1960s, and 249 acres were harvested in 1985 to 1987. As a result, 4.0 miles of road were constructed.

VCU 231 (Saltery Bay)

This VCU is located along Tenakee Inlet in the northwestern part of the Project Area. It includes the area surrounding Saltery Bay and the watersheds that extend up the valley into the interior of the island. The VCU contains 18,925 acres and approximately 11.2 miles of shoreline. Over 50 percent of the VCU contains high-elevation, nonforested alpine and forested subalpine soils. Both are located on the mountain summits and shoulder slopes that surround the VCU. VCU 231 was assigned a LUD IV designation in the TLMP. Prior to 1971, approximately 326 acres were harvested; however, no roads were constructed.

VCU 232 (Crab Bay)

This VCU is located along Tenakee Inlet in the northcentral portion of the Project Area. It encompasses the mountain slopes on the north shore of Crab Bay and the upland areas surrounding the head of Crab Bay. The VCU contains 11,259 acres and approximately 10.4 miles of shoreline. High-elevation alpine and subalpine soils comprise over 40 percent of the VCU. These occur on mountain summits and shoulder slopes that form the boundary of the VCU. VCU 232 was assigned a LUD IV designation in the TLMP. Approximately 268 acres of timber were harvested prior to 1961; however, no roads were constructed.

VCU 233 (South Crab Bay)

This VCU is located along Tenakee Inlet in the northcentral portion of the Project Area. It encompasses the south shore of Crab Bay (near the entrance to the bay) and the South Crab Creek watershed south of the bay. South Crab Creek watershed extends southwest for approximately 6 miles, beginning at the tidal flat on the south shore of Crab Bay. The VCU contains 10,102 acres and approximately 3.5 miles of shoreline. VCU 233 was assigned a LUD IV designation in the TLMP. Approximately 287 acres of timber were harvested during the 1970s as part of the APC contract. Also during this time, 6.7 miles of road were constructed.

VCU 234 (Inbetween)

This VCU is located along Tenakee Inlet in the northcentral portion of the Project Area. It includes the shoreline facing Tenakee Inlet between Crab Bay and Kadashan Bay and also includes the small watershed that lies between South Crab Creek and the Kadashan River. The VCU contains 5,807 acres and approximately 2.4 miles of shoreline. VCU 234 was assigned a LUD IV designation in the TLMP. Approximately 526 acres of timber were harvested during the 1970s as part of the APC contract. Also during this time, 6.2 miles of road were constructed.

VCU 235 (Kadashan River)

This VCU is located along Tenakee Inlet in the northcentral part of the Project Area. It includes the land surrounding Kadashan Bay and the watersheds to the south that drain into Kadashan Bay. The VCU contains a total of 33,652 acres and has approximately 7.0 miles of shoreline. It is the largest VCU in the Project Area. It is dissected by Tonalite Creek and the Kadashan River (both of which discharge into Kadashan Bay) and by Hook Creek, a tributary of the Kadashan River. VCU 235 was designated a LUD II by the Tongass Timber Reform Act of 1990 (TTRA). Prior to its being designated as a LUD II, approximately 129 acres of timber harvest and 5.8 miles of road construction have occurred.

VCU 236 contains second–growth conifers such as pictured above

VCU 236 (Corner Bay)

This VCU is located along Tenakee Inlet in the northeastern corner of the Project Area. It includes the land between Kadashan Bay and Corner Point and also includes the watersheds to the south, including Corner Creek. Elevations range from sea level to over 2,700 feet. There are a total of 11,029 acres in VCU 236, and it contains approximately 6.9 miles of shoreline. The Corner Bay logging camp and associated log transfer facility is located in this VCU. A road roughly parallels Corner Creek from Corner Bay to Kook Lake. VCU 236 was assigned a LUD IV designation in the TLMP. As part of the APC contract, approximately 2,084 acres of timber were harvested from this VCU, most of it during the 1970s and 1980s. Also during the 1980s, 20.1 miles of road were constructed.

VCU 237 (Trap Bay)

This VCU is located along Tenakee Inlet in the northeastern corner of the Project Area. It includes the land between Corner Point and South Passage Point and also includes the watersheds to the south that flow into Tenakee Inlet. The VCU contains 6,646 acres and has approximately 8.6 miles of shoreline. VCU 237 was designated a LUD II by the TTRA. No previous timber harvest and road construction have taken place in this VCU.

VCU 238 (South Passage)

This VCU is located along Chatham Strait in the northeastern corner of the Project Area. It includes the land between South Passage Point and the unnamed point approximately 2.5 miles north of Basket Bay. This entire area contains a number of small unnamed watersheds that flow into Chatham Strait. The VCU contains 9,946 acres and has approximately 5.0 miles of shoreline. It is bordered by Chatham Strait on the east and is dissected by three stream systems. VCU 238 was assigned a LUD IV designation in the TLMP. No timber harvest or road construction occurred in this VCU prior to activities authorized by the Final Supplement to the Environmental Impact Statements (SEIS) for the 1981 to 1986 and 1986 to 1990 operating periods. Entry into this VCU first occurred in 1990. Currently, there are 7.3 miles of roads constructed.

VCU 239 (Kook Lake)

This VCU is located along Chatham Strait in the eastern end of the Project Area. It includes the land surrounding Kook Lake and Basket Bay and the land drained by Kook Creek. The VCU contains 17,344 acres and has approximately 9.3 miles of shoreline. VCU 239 was assigned a LUD III designation in the TLMP. Approximately 1,994 acres of timber were harvested from this VCU; the majority were harvested during the 1970s and 1980s as part of the APC contract. Also during this time, 21.0 miles of road were constructed.

VCU 240 (Little Basket Bay)

This VCU is located along Chatham Strait in the eastern end of the Project Area. It includes the land surrounding Basket Lake and Little Basket Bay and the land drained by Basket Creek. The VCU contains 9,384 acres and has approximately 1.9 miles of shoreline. VCU 240 was assigned a LUD IV designation in the TLMP; 4 acres have been harvested from this VCU. No road construction has occurred.

VCU 241 (Do 2 Station)

This VCU is located along Chatham Strait in the eastern end of the Project Area. It includes the land between Little Basket Bay and a point approximately 1.3 miles north of White Rock. This VCU contains a number of small unnamed watersheds that flow into Chatham Strait. It also includes two small unnamed lakes. The VCU contains 7,640 acres and has approximately 5.6 miles of shoreline. VCU 241 was assigned a LUD IV designation in the TLMP. Approximately 784 acres of timber were harvested from this VCU during the 1970s as part of the APC contract, and 7.2 miles of roads were constructed.

VCU 242 (White Rock)

This VCU is located along Chatham Strait in the southeastern corner of the Project Area. It includes the land between Point Hayes and a point approximately 1.3 miles north of White Rock. This area contains the White Rock Creek watershed as well as broken mountain slopes south of White Rock. The VCU contains 11,455 acres and has approximately 9.8 miles of shoreline. VCU 242 was assigned a LUD IV designation in the TLMP. Approximately 1,404 acres of timber were harvested from this VCU during the 1970s as part of the APC contract. Also during this time, 14.1 miles of road were constructed.

VCU 243 (Sitkoh Bay)

This VCU is located near the junction of Chatham Strait and Peril Strait in the southeastern corner of the Project Area. It includes the land surrounding Sitkoh Bay and Florence Bay and also includes most of the watersheds that drain into these bays. The only watershed that is not in this VCU is Sitkoh Creek, which has been identified as VCU 244. VCU 243 contains a total of 27,208 acres and has approximately 20.3 miles of shoreline. It is the second largest VCU in the Project Area. It has one major stream system (Sitkoh Bay Creek), which contains multiple forks and encompasses the entire upper end of the valley above the head of Sitkoh Bay. This creek flows into Sitkoh Bay through an extensive estuary zone consisting of sparsely vegetated mudflats, sedge marshland, and mixed-forb grassland. VCU 243 was assigned a LUD IV designation in the TLMP. Approximately 3,244 acres of timber were harvested from this VCU during the 1970s as part of the APC contract. Also during this time, 29.9 miles of road were constructed.

VCU 244 (Sitkoh Lake)

This VCU is located near the junction of Chatham Strait and Peril Strait in the southeastern corner of the Project Area. It includes the area surrounding Sitkoh Lake and Sitkoh Creek (which flows from the lake to Sitkoh Bay). VCU 244 contains a total of 12,283 acres and has approximately 0.1 miles of shoreline. There are two Forest Service cabins on the lake; these are available for use by recreational users. There is also a trail from Sitkoh Bay to Sitkoh Lake.

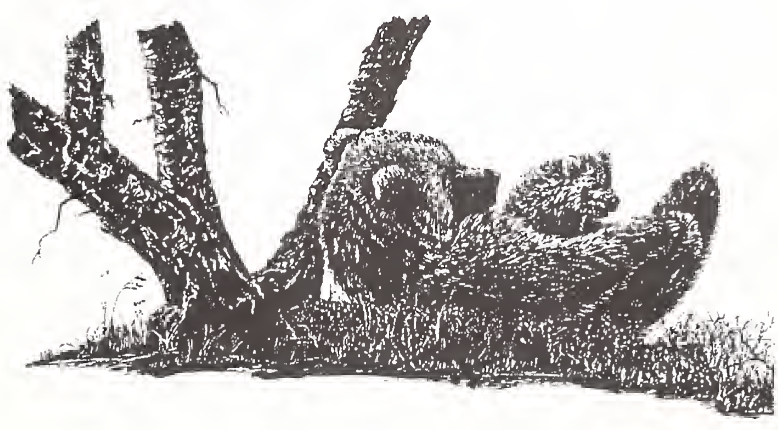
VCU 244 was assigned a LUD IV designation in the TLMP. Approximately 2,282 acres of timber were harvested from this VCU during the 1970s as part of the APC contract. Also during this time, 12.5 miles of road were constructed.

VCU 245 (False Island)

This VCU is located near the junction of Chatham Strait and Peril Strait along the southern edge of the Project Area. It includes the broken mountain slopes and small watersheds facing Peril Strait from Point Craven to the divide between Oly Creek and Broad Creek. The VCU contains 23,917 acres and approximately 26.8 miles of shoreline. It is the third largest VCU in the Project Area. Oly Creek and False Island Creek both are in the northwest portion of the VCU. It also has major anchorages at Lindenberg Harbor and False Island. VCU 245 was assigned a LUD IV designation in the TLMP. As part of the APC contract, approximately 4,102 acres of timber have been harvested from this VCU during the 1960s and 1970s. Also during this time, 24.6 miles of road were constructed.

VCU 246 (Broad Island)

This VCU is located along Peril Strait on the southern edge of the Project Area. It includes the area that encompasses Broad Creek and Broad Finger Creek. The VCU contains 17,290 acres and has approximately 4.5 miles of shoreline. Over 40 percent of the VCU lies within the alpine and subalpine zones in the mountains surrounding the western end of the VCU. VCU 246 was assigned a LUD IV designation in the TLMP. Approximately 42 acres of timber were harvested from this VCU prior to 1961; however, no roads were constructed.



Yellow-cedar

Timber and Other Vegetation

Western hemlock and Sitka spruce dominate timber stands throughout the Southeast Chichagof Project Area. Other timber species include mountain hemlock, lodgepole pine, red alder, and Alaska-cedar (also known as yellow-cedar).

Western hemlock and Sitka spruce develop best on well-drained valley bottoms and lower slopes; however, they also occur anywhere between sea level and timberline. Both species are harvested for commercial purposes. Alaska-cedar occurs in limited numbers in stands throughout the area and is a highly valued commercial species. Lodgepole pine (also called shore pine) is usually considered a commercial species but is rarely harvested in Southeastern Alaska because it does not meet merchantability standards. The major noncommercial species is red alder, commonly found along beaches and streams and on steeper slopes where soils have been highly disturbed, such as on logging unit landings, spur roads, and cable roads.

Most of the commercial forest land remaining in the Project Area is considered mature or overmature. These stands are also commonly referred to as climax plant communities or old-growth forests. Although most of the timber in old-growth forests is of declining commercial quality, it is suitable for the production of pulp and lumber.

Mature and overmature stands have an uneven appearance because they contain trees of many ages, sizes, with many dead tops and snags. In contrast, stands that have been disturbed during the last 100 to 200 years by fire, landslide, windthrow, or logging have a more uniform appearance because they contain trees of relatively uniform age and size with fewer snags and defective trees. Even-aged stands convert to uneven-aged stands as mortality occurs due to insects, disease, wind, snow, and ice. This opens up stands for new growth to occur. This change in stands is a continuing process. Harvested, mature stands are returned to even-aged stands as they regenerate (Harris and Farr 1974).

Commercial Forest Land (CFL)

Depending on its vegetative cover, land in the Project Area has been categorized as forest land or nonforest land (Table 3-1). Forest land is further categorized as commercial forest land (CFL) or noncommercial forest land (non-CFL).

Land is considered commercial if it produces or if it is capable of producing continuous crops of timber and has not been withdrawn from the timber base by statute or administrative action. The Forest Service has specified that in order to fit into the category of commercial timber production, the land must produce 20 cubic feet/acre/year or have 8 thousand board feet per acre of net timber volume (Forest Service 1978). Mature, overmature, and second-growth stands, as well as areas that have been logged and/or have regenerated, may qualify as CFL. About 54 percent of the land in the Southeast Chichagof Project Area is CFL.

Table 3-1
Landbase

VCU	Nonforested Acres	Forested Non-CFL Acres	Forested CFL Acres	Total Acres
227	559	1,760	1,510	3,829
228	6,590	5,651	6,388	18,629
229	6,746	7,796	8,018	22,560
230	2,250	2,284	4,862	9,396
231	6,794	4,594	7,537	18,925
232	3,187	2,543	5,529	11,259
233	1,664	3,371	5,067	10,102
234	546	1,661	3,600	5,807
235	5,607	10,257	17,788	33,652
236	1,075	1,820	8,134	11,029
237	1,270	1,040	4,334	6,646
238	2,573	1,458	5,915	9,946
239	3,567	3,284	10,493	17,344
240	2,415	2,008	4,961	9,384
241	1,604	1,446	4,590	7,640
242	1,572	2,662	7,221	11,455
243	3,806	6,555	16,847	27,208
244	1,750	3,123	7,410	12,283
245	4,237	3,552	16,128	23,917
246	3,590	5,509	8,191	17,290
Total	61,404	72,374	154,523	288,301
Percent of Total Acres	21	25	54	

SOURCE: Anderson and Lilly 1991.

Non-CFL land is forested land that is incapable of producing commercial quantities of timber or has been withdrawn from the timber base. Approximately 25 percent of the Southeast Chichagof Project Area is forested non-CFL land. The remaining 21 percent is classified as nonforest and includes salt marshes and estuaries, alpine areas, and nontimbered mountain tops.

Nonforest land includes estuaries.

Site Class

Site class is a relative measure of the productivity of land for tree growth. A site class is based on a range of site indices. The site index is based on the expected height to which a tree will grow on a site within a given number of years; 50 years is the index age most commonly used in the Tongass National Forest. Based on the site index, stands of trees are assigned a site class of low, medium or high. A low site class includes a range of site indices from 41 to 68, a medium site class includes a range of site indices from 69 to 98, and a high site class includes site indices 99 and greater (Forest Service 1991b).

In general, more timber can be grown at less cost and yield a greater economic return on a high site than on a medium or low site (Davis 1966). By mixing high, medium, and low sites, average harvest costs for low sites can be reduced and, as a result, more land can come under timber management. Table 3-2 displays the distribution of site classes within the Project Area.

Table 3-2
Site Class Distribution for the Southeast Chichagof Project Area (in acres)

VCU	Low	Medium	High	Total
227	1,211	186	113	1,510
228	3,821	2,034	533	6,388
229	4,207	2,733	1,078	8,018
230	2,843	1,384	635	4,862
231	3,162	3,372	1,003	7,537
232	2,170	2,490	869	5,529
233	2,220	2,308	539	5,067
234	718	2,596	285	3,600
235	6,426	7,747	3,615	17,788
236	2,220	4,455	1,459	8,134
237	1,431	1,715	1,188	4,334
238	1,689	3,028	1,198	5,915
239	2,858	5,008	2,627	10,493
240	1,344	2,730	887	4,961
241	850	1,722	2,018	4,590
242	2,303	3,558	1,361	7,221
243	5,788	8,163	2,896	16,847
244	1,743	3,870	1,797	7,410
245	5,540	8,119	2,468	16,128
246	3,730	3,905	556	8,191
Total	56,274	71,125	27,124	154,523

SOURCE: Anderson and Lilly 1991.

Strata

Commercial forest land on the Tongass National Forest has been classified into strata for analysis purposes. Each stratum represents a range of merchantable timber volume per acre. Placing the timber in strata allows the Forest Service to roughly estimate the volume for each VCU. Table 3-3 displays the volume range for merchantable timber (greater than 8 MBF per acre) for Strata A through D. Table 3-4 shows the acres of CFL in Strata A through D in the Southeast Chichagof Project Area.

Table 3-3
Timber Volume by Stratum

Stratum	Range of Volume (MBF/acre)
A	8 - 20
B	20 - 30
C	30 - 50
D	greater than 50

SOURCE: Forest Service 1990a.

Table 3-4
Commercial Forest Land by Stratum (in acres)

VCU	Forested CFL	Stratum A	Stratum B	Stratum C	Stratum D	Other[1]
227	1,510	943	490	77	0	0
228	6,388	3,536	2,731	121	0	0
229	8,018	4,572	2,484	603	0	359
230	4,862	3,959	452	120	0	331
231	7,537	5,069	1,637	206	302	323
232	5,529	3,547	1,312	403	0	267
233	5,067	3,706	915	115	40	291
234	3,600	2,334	595	171	0	500
235	17,788	7,057	6,284	4,350	0	97
236	8,134	2,294	3,186	844	0	1,810
237	4,334	1,803	1,731	800	0	0
238	5,915	2,503	2,714	425	0	273
239	10,493	3,758	3,796	807	0	2,132
240	4,961	2,483	2,115	297	0	66
241	4,590	1,457	1,712	617	0	804
242	7,221	2,376	3,112	150	0	1,583
243	16,847	7,488	5,430	340	0	3,589
244	7,410	2,612	2,219	309	57	2,213
245	16,128	5,325	6,112	304	0	4,387
246	8,191	6,781	1,280	69	0	61
Total	154,523	73,600	50,307	11,129	399	19,088
Percent	100	48	33	7	0	12

SOURCE: Anderson and Lilly 1991.

1 Acreage in this column is classified as CFL but contains less than 8 MBF per acre and includes acres of young growth which have not grown into Stratum A.

Tentatively Suitable for Harvest

CFL is further classified as tentatively suitable or not tentatively suitable for timber harvest. In order to be considered tentatively suitable, forested land must:

- Be at least 10 percent occupied by forest trees;
- Be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;
- Have a reasonable assurance that the area can be restocked within 5 years after final harvest; and
- Not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service (Forest Service 1990a).

For the purposes of this analysis, available tentatively suitable forested land must also:

- Have sufficient timber volume to be currently available for harvest (be in Stratum A, B, C, or D);
- Have a LUD that allows commercial timber harvest (LUD III or LUD IV); and
- Not be included in a stream buffer as required by TTRA for a Class I or a Class II stream flowing directly into a Class I stream.

Sitka spruce stand

In the Southeast Chichagof Planning Area, VCUs 228, 229, 235, and 237 are classified as LUD II; thus, all commercial forest land in these VCUs is classified as not tentatively suitable. Table 3-5 shows the acres, by VCU, of available tentatively suitable forested land in the Southeast Chichagof Project Area.

Table 3-5
Available Tentatively Suitable Forest Land

VCU	Total Available Tentatively Suitable (acres)	Volume Stratum (acres) A	B	C	D
227	900	481	356	63	0
230	3,188	2,948	170	70	0
231	4,427	3,345	887	105	90
232	3,504	2,405	924	175	0
233	2,862	2,211	547	79	25
234	1,831	1,339	409	83	0
236	4,656	1,568	2,471	617	0
238	4,944	1,953	2,733	258	0
239	5,794	2,477	2,819	498	0
240	2,729	1,446	1,068	215	0
241	2,666	890	1,323	453	0
242	4,103	1,607	2,412	84	0
243	8,974	4,701	4,060	213	0
244	4,413	2,358	1,747	308	0
245	9,542	4,299	5,039	204	0
246	5,237	4,280	914	43	0
Total	69,770	38,308	27,879	3,468	115

SOURCE: Anderson and Lilly 1991.

Past Timber Harvest

The timber harvested to date in the Southeast Chichagof Project Area has been from mature or overmature stands. Commercially harvested species include western and mountain hemlock, Sitka spruce, and Alaska-cedar. Table 3-6 summarizes the timber acreage harvested to date in the Southeast Chichagof Project Area.

Table 3-6
Acres of Past Timber Harvest


Past timber harvest

VCU	Before 1961	1961-69	1970-80	1981-90	SEIS	Total
229	0	0	305	0	0	305
230	0	48	0	249	0	297
231	73	253	0	0	0	326
232	268	0	0	0	0	268
233	0	0	287	0	0	287
234	0	0	526	0	0	526
235	0	129	0	0	0	129
236	225	0	1,155	105	666	2,151
238	0	0	0	0	1,098	1,098
239	0	0	1,305	271	508	2,084
240	0	0	4	0	0	4
241	0	0	784	0	0	784
242	0	0	1,404	0	371	1,775
243	52	0	3,192	0	842	4,086
244	0	0	2,282	0	0	2,282
245	0	2,409	1,693	0	0	4,102
246	42	0	0	0	0	42
Total	660	2,839	12,937	625	3,485	20,546
Percent	3	14	63	3	17	100

SOURCE: Anderson and Lilly 1991.

Silviculturists have been certifying regeneration of the Chatham area forests since 1976. Regeneration is the process of establishing a new crop of trees on the harvested units. A harvest unit may be certified when it is adequately stocked with healthy young trees, usually within 3 to 5 years after a stand has been harvested. Southeast Chichagof Project Area reforestation records contain data on a total of 18,131 acres (Table 3-7). Of this total, 15,563 acres have been reforested by natural seeding and 1,193 acres have been hand planted. Over 92 percent of all acres previously harvested have been certified as being adequately stocked. The remaining acres currently not certified have not had sufficient time since harvest operations to be restocked.

Table 3-7
Certification of Regeneration

VCU	Acres	Year Logged	Acres Planted	Year Planted	Plant Cert.	Natural Acres	Year Cert.
229	305	1970	0	0	0	305	1977
230	48	1966	0	0	0	48	1969
	249	1986	95	1987	*	110	1990
231	22	1956	0	0	0	22	1964
	51	1957	0	0	0	51	1963
	67	1962	0	0	0	67	1966
	52	1963	0	0	0	52	1967
	134	1965	33	1981	1991	101	1969
232	156	1958	0	0	0	156	1964
	112	1959	0	0	0	112	1962/64
233	67	1977	0	0	0	58	1981
	46	1978	0	0	0	46	1984
	174	1979	0	0	0	174	1984/85
234	110	1978	0	0	0	110	1984
	416	1979	0	0	0	416	1984
235	129	1961	0	0	0	129	1965
236	225	1960	0	0	0	225	1978
	51	1973	0	0	0	26	1978
	479	1974	76	1981	1986	403	1978
	396	1975	183	1980	1986	213	1978/79/86
	100	1976	0	0	0	100	1980
	129	1978	28	1984	1986	101	1982/83
	105	1986	57	1987	1990	48	1990
	271	1990	*	*	*	*	*
	328	1991	*	*	*	*	*
238	53	1991	*	*	*	*	*
239	330	1975	0	0	0	330	1979/81
	489	1976	188	1982	1986	301	1979/80/90
	275	1977	203	1982	1985	72	1985/89/91
	211	1978	0	0	0	211	1980/82/83
	49	1986	49	1987	1990	0	0
	222	1989	*	*	*	*	*
	418	1990	*	*	*	*	*
240	4	1978	0	0	0	4	1983
241	10	1976	0	0	0	10	1980
	603	1977	0	0	0	603	1981
	171	1978	0	0	0	171	1983
242	73	1975	0	0	0	73	1980
	886	1976	143	1984	1986	743	1980/81
	445	1977	138	1980	1982	307	1980/81

Table 3-7 (Continued)
Certification of Regeneration

VCU	Acres	Year Logged	Acres Planted	Year Planted	Plant Cert.	Natural Acres	Year Cert.
243	52	1920	0	0	0	52	1923
	10	1971	0	0	0	10	1975
	252	1972	0	0	0	252	1976
	783	1973	0	0	0	783	1976/77
	156	1974	0	0	0	156	1978/80
	482	1975	0	0	0	482	1978/79/80
	866	1976	0	0	0	866	1978/80
	107	1977	0	0	0	107	1980/81
	536	1978	0	0	0	536	1981/82/83
244	72	1970	0	0	0	72	1975
	968	1971	0	0	0	968	1975/76
	967	1972	0	0	0	967	1976
	187	1975	0	0	0	187	1978
	88	1976	0	0	0	88	1979
245	62	1967	0	0	0	62	1975
	1,744	1968	0	0	0	1,744	1972/73
	603	1969	0	0	0	603	1972/73/74
	101	1971	0	0	0	101	1976/77
	1,444	1975	0	0	0	1,439	1978/79/80
	136	1976	0	0	0	136	1980
	12	1978	0	0	0	12	1981
246	26	1925	0	0	0	26	1928
	16	1930	0	0	0	16	1933
Total	18,131		1,193			15,563	

SOURCE: Anderson and Lilly 1991.

* These acres have not had sufficient time since harvest to become restocked or for the regeneration to be certified.

Precommercial Thinning

Precommercial thinning involves the selective removal of trees from second-growth stands that are 15 to 25 years old. Thinning reduces competition among trees in the stand, enabling the remaining trees to grow faster. Precommercial thinning may also benefit other resources (such as wildlife) by allowing more light to reach the forest floor thereby increasing understory vegetative production. Approximately 1,076 acres have been thinned in the Project Area (Table 3-8).

Table 3-8
Past Precommercial Thinning

VCU	Acres
235	129
236	225
245	722
Total	1,076

SOURCE: Anderson and Lilly 1991.

Forested Plant Communities

In many areas of the Southeast Chichagof Project Area, rock and persistent snow pack provide a striking contrast to the vegetation mosaic. The natural vegetation is a mixture of coniferous forests interspersed with alpine tundra, muskeg (bog), shrubland, estuarine, and beach-fringe plant communities. The vegetation has been classified into plant associations, with each association named according to the climax plant community present in the area. The climax plant community is the result of the interaction between landform, climate, and soils. All plant associations having the same climax tree(s) are referred to as a series and are named according to the climax tree(s). There are four major plant series in the Southeast Chichagof Project Area. The following series descriptions are based upon Martin (1989). Forested plant commu nities, displayed by VCU in Table 3-9 are described below.

Western Hemlock Series

Plant associations in this series generally occur in the uplands on mountains, hills, and footslope landforms with moderately drained to well-drained soils. The predominant overstory tree species is western hemlock. While Sitka spruce does occur in the overstory, it is generally a minor component. The shrub layer is dominated by blueberry and rusty menziesia; devil's club can be a major component in some areas. Bunchberry and five-leaf bramble dominate the herb layer; however, skunk cabbage can be a major component in areas with seasonally wet soils. Plant productivity is generally high, with mature hemlock often exceeding 100 feet in height.

Sitka Spruce Series

Plant associations in this series are generally associated with riparian areas and other disturbed sites such as stringers between avalanche chutes. This series occurs predominantly on warmer sites at lower elevations. Sitka spruce is the dominant overstory tree species but western hemlock can be a co-dominant. Other tree species such as mountain hemlock, Alaska-cedar, and shore pine rarely occur. Dominant shrub species include alder, devil's club, and blueberry, with salmonberry occurring

to a lesser degree. Ferns and skunk cabbage are the dominant herbs. The Sitka spruce series is generally highly productive; the heights of mature trees often exceed 125 feet.

Table 3-9
Forested Plant Communities (in acres)

VCU	Sitka Spruce	Western Hemlock	Mountain Hemlock	Mixed Conifer
227	0	700	389	1,244
228	660	3,543	1,064	3,739
229	913	4,469	1,006	4,381
230	166	2,686	654	2,388
231	550	4,825	1,441	1,824
232	678	3,687	355	1,330
233	477	2,631	1,054	1,516
234	158	2,208	430	1,050
235	1,699	13,663	1,719	6,119
236	670	5,510	531	1,539
237	402	2,810	448	768
238	641	3,773	628	913
239	1,572	6,843	1,512	1,293
240	352	3,194	536	1,255
241	290	3,327	778	433
242	711	5,303	905	1,058
243	1,954	10,614	1,592	4,680
244	319	5,750	536	1,667
245	838	13,901	1,699	1,135
246	321	5,220	1,692	2,581
Total	13,369	104,660	18,969	40,914

SOURCE: Anderson and Lilly 1991.

Mixed Conifer Series

These plant associations generally occur in the uplands, often near muskegs. Dominant overstory tree species are mountain hemlock, western hemlock, and Alaska-cedar. Sitka spruce and shore pine can occur but are a minor component where present. Blueberry and rusty menziesia are the dominant shrub species. Dominant herbs vary and include skunk cabbage, five-leaf bramble, deer cabbage, and ferns. Plant productivity is primarily limited by poor soil drainage.

Mountain Hemlock Series (and Alaska-cedar as minor component)

These plant associations are generally found on cold, high-elevation sites above the western hemlock series. Mountain hemlock is the dominant overstory tree species with Sitka spruce and Alaska-cedar occurring to a lesser degree. The shrub layer is dominated by blueberry with copper bush and cassiope also occurring. Deer cabbage is the dominant herb. Plant productivity is limited by the shorter growing season at high elevations and by reduced soil drainage.

The western hemlock series is the most common plant series found in the Southeast Chichagof Project Area; it is found on over 104,660 acres. The second most common plant series is mixed conifer, found on over 40,914 acres. This is followed by mountain hemlock series, found on over 18,969 acres, and the Sitka spruce series, found on over 13,369 acres. Alaska-cedar is a minor component in all the above plant series.

Nonforest Plant Communities

Various nonforest plant communities also occur in the Project Area. These plant communities occur near estuaries, and in riparian areas, muskegs, alpine meadows, and alpine-lichen rock outcrops. Table 3-10 displays nonforest plant communities within the Project Area. The descriptions that follow are based on DeMeo (1989).

Estuary Tidal Flats

These areas are inundated by high tides. Vegetation consists primarily of sedges, red fescue, and sea milkwort. Bluejoint and sedges dominate on low terraces that are rarely inundated by tides but which have high water tables.

Shrub Riparian Areas

Shrub riparian areas are found on highly active floodplains which are frequently disturbed. Soils are generally deep and well drained. Salmonberry, stink currant, devil's club, and ferns are the dominant vegetation. Willow and cottonwood are occasionally found in shrub riparian areas. While not occupying a large area, these willow and cottonwood plant communities are unique to the islands of the Chatham Area.

Muskegs

Muskegs are dominated by sphagnum moss and sedges. Trees and shrubs are rare. The water table is at the surface and numerous small ponds are scattered throughout the muskegs.

Alpine Meadows

These areas are dominated by cassiope and mixed forbes, including mountain heather. These are found on steep, well-drained rock outcrops at high elevations.

Alpine meadow

Alpine-lichen Rock Outcrops

These are found at high elevations above timberline. Plant cover does not exceed 50 percent. Species diversity is high and includes cassiope, clubmoss, and grass species.

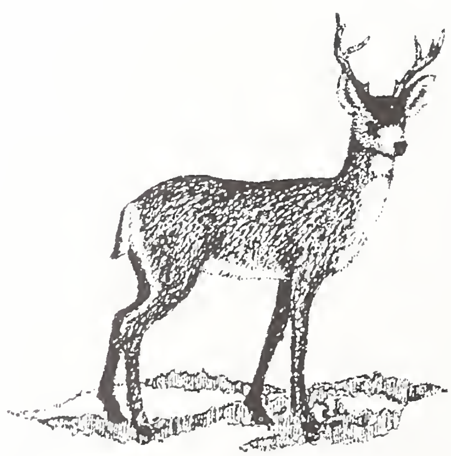
Threatened and Endangered Plant Species

The Endangered Species Act of 1973 mandates that Federal agencies "shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." The Forest Service is directed to manage native plants to maintain viable populations and to avoid actions that may cause a plant to become listed as threatened or endangered. Sensitive plants are those plants for which population viability is a concern. Twenty-three vascular plants have been recommended for designation as sensitive species in the Alaska Region of the Forest Service. Four Category 2 candidate plant species may occur in the Project Area (Lindell 1992). However, no plants have been listed as threatened, endangered, or sensitive in Southeast Alaska. For more information, refer to the Biological Assessment in Appendix F.

Table 3-10
Nonforest Plant Communities (in acres)

VCU	Estuary Tidal Flats	Shrub Riparian	Muskeg	Meadows	Alpine Lichen Rock Outcrop
227	50	35	642	629	90
228	409	2,038	1,227	4,520	1,035
229	455	3,214	1,209	5,213	856
230	327	486	412	2,376	109
231	488	2,280	1,570	5,841	343
232	665	1,098	1,353	1,974	667
233	121	734	1,489	2,006	159
234	243	210	552	1,156	20
235	1,398	2,678	4,005	4,170	71
236	307	750	641	760	67
237	146	916	135	636	370
238	183	1,823	360	1,305	364
239	64	1,997	610	2,646	117
240	0	1,540	523	1,504	322
241	8	825	200	1,272	432
242	219	1,434	1,042	778	131
243	625	2,120	2,434	3,624	82
244	2	908	1,090	1,448	42
245	187	2,000	383	3,516	381
246	187	1,235	2,322	3,705	193
Total	6,086	28,321	22,198	49,079	5,850

SOURCE: Anderson and Lilly 1991.



Floodplains and Wetlands

Like much of Southeast Alaska, the Southeast Chichagof Project Area contains a large proportion of floodplains and wetlands. Approximately 58,500 acres (20 percent) of the Project Area is classified and mapped as floodplains or wetlands according to the soil and landform inventory database. Table 3-11 displays the acreage and distribution by VCU of floodplains and wetlands in the Southeast Chichagof Project Area.

Federal agencies are required to avoid, to the extent possible, activities which might result in negative effects associated with the occupancy or modification of these areas. The actions proposed in the Southeast Chichagof Project Area were designed to minimize activities in the floodplains and wetlands.

Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the short- and long-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to 1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives, 2) evaluate the potential effects of any proposed action on floodplains, 3) ensure planning programs and budget requests reflect consideration of flood hazards and floodplain management, and 4) prescribe procedures to implement the policies and requirements of the Order.

Floodplains are usually built of naturally eroded sediments carried by the stream or river and deposited in slack water sections of channels during high-water periods. Floodplains are defined as areas subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year. Nutrient-rich sediments underlaid by coarse-textured sediments make floodplains the most productive lowland timber, wildlife, and fisheries resource sites in the Project Area. Table 3-11 displays the number of acres of floodplains in the Project Area.

Muskeg

Table 3-11
Floodplains and Wetlands (in acres)

VCU	Floodplains	Wetlands Forested	Other Non-forest	Total
227	0	1,178	983	2,161
228	403	4,558	295	5,256
229	590	4,886	336	5,812
230	109	2,390	690	3,189
231	588	1,305	2,138	4,031
232	553	1,044	1,689	3,286
233	480	1,243	1,861	3,584
234	31	849	816	1,696
236	120	1,228	1,032	2,380
239	610	1,040	913	2563
240	417	1,073	864	2,354
241	127	247	360	734
242	122	593	1,629	2,344
243	768	3,756	3,915	8,439
244	349	1,152	1,781	3,282
245	333	918	581	1,832
246	318	1,721	3,561	5,600
Total	5,918	29,181	23,444	58,543

SOURCE: Anderson 1992.

Note: This information derived from Chatham Area Geographic Information Systems (GIS) database.

Wetlands

Executive Order 11990, as amended (42 U.S.C. 4321 et seq.), requires Federal agencies having statutory authority and leadership over Federal lands to avoid, to the extent possible, the short- and long-term adverse impacts associated with the destruction or modification of wetlands. Where feasible, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for 1) acquiring, managing, and disposing of lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use.

The U.S. Army Corps of Engineers (COE 1987) and the Environmental Protection Agency (EPA) jointly define wetlands as "Those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The COE and EPA signed a Memorandum of Agreement that provides clarification and general guidance regarding the level of mitigation necessary to demonstrate compliance with the Clean Water Act in connection with standard Section 404 dredge and fill permits. The President's Domestic Policy Council is charged with developing recommendations regarding the attain-

ment of the goal of no net loss of the Nation's wetlands. This Council will consider the challenges posed in Alaska, a state where a high proportion of developable land is wetlands and where technical difficulties exist regarding opportunities for compensatory mitigation. The Forest Service's objective is to support the President's Domestic Council assignment during project planning. The COE Wetlands Delineation Manual (COE 1987) provides the standards for determining areas of wetlands and deep-water habitats.

Wetlands influence flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality. In the Southeast Chichagof Project Area, wetlands range from sea level to alpine. They include forested sites on poorly and very poorly drained organic soil, and poorly and somewhat poorly drained mineral soils. Open sites of herbaceous plants are found on poorly and very poorly drained organic soils (muskegs). Table 3-11 displays the acres of wetlands occurring in the Project Area.

Floodplain

Soils

The development of soils in Southeast Alaska is influenced by high levels of rainfall, cool summer temperatures, a short growing season, and cool (5° to 8° Centigrade) soil temperatures. Under such conditions, organic matter decomposes slowly and tends to accumulate in areas where it is produced or deposited. Because of the high rainfall, exposed mineral soils are subject to erosion and rapid leaching of available nutrients. Soils influence the overall vegetation composition and productivity of timber, fish, and wildlife in the Project Area.

In general, shallow soils with good drainage develop on steeper slopes. Deep, well-drained soils commonly occur lower in the landscape, and are on gentle slopes where transported soil materials have collected. Poorly drained soils are associated with low relief and/or impermeable subsurface layers. In locations with poor drainage and low relief, deep organic soils (muskegs) tend to form. In riparian areas, soil zones tend to contain deeply stratified sand and gravel as a result of cyclic flood deposition.

The potential for soil movement is based upon existing soil properties such as erodibility, mass-movement (landslide) potential, quantity of soil material available as sediment, amount of unvegetated or bare soil, and the effects of climate (e.g., intensity and frequency of rainfall). Most undisturbed soils in the Southeast Chichagof Project Area are resistant to surface erosion. This is because of relatively thick layers of surface organic matter and vegetation which act as protective covers. Natural sources of surface erosion and mass movement do exist and include streambanks, snowslide or avalanche slopes, and V-notches.

Mass-movement hazard classes are used to group soil/land-type units that have similar properties. Four hazard classes (extreme, high, moderate, and low) rank soil units according to their relative potential for mass movement. The Forest Service avoids scheduling timber harvest and road building on extreme-hazard soil. These include shallow, fine-textured soils on slopes of 75 percent or greater, as well as some soils with restricted drainage on slopes in excess of 65 percent. Nearly all naturally occurring landslides are found in extreme-hazard soil areas. These areas often have visible indications of instability or past failures such as slide scarps, tension cracks, jack-strawed trees, or disturbance-preferring plant communities. Table 3-12 lists the total acreage of each mass-movement class by VCU for the Project Area.

Table 3-12
Total Area of Each Mass-Movement Class for Southeast Chichagof Project Area (in acres)

VCU	Low	Mass-Movement Hazard Ratings Moderate	High	Extreme	Total VCU Area
227	1,719	1,484	561	65	3,829
228	7,597	2,913	4,349	3,770	18,629
229	7,533	3,085	5,274	6,668	22,560
230	3,524	2,612	2,509	751	9,396
231	7,913	3,132	5,171	2,709	18,925
232	6,450	1,456	2,159	1,195	11,259
233	4,273	1,678	2,971	1,181	10,102
234	2,674	1,207	1,501	425	5,807
235	17,522	5,346	7,466	3,318	33,652
236	5,217	2,193	2,490	1,129	11,029
237	4,408	601	923	714	6,646
238	4,742	1,217	2,238	1,748	9,946
239	8,275	2,160	4,292	2,617	17,344
240	4,020	1,648	2,038	1,678	9,384
241	3,372	1,173	1,995	1,100	7,640
242	5,979	2,326	1,448	1,702	11,455
243	13,592	4,162	5,942	3,512	27,208
244	5,463	2,850	2,695	1,275	12,283
245	7,264	2,856	10,772	3,025	23,917
246	7,900	2,165	5,264	1,961	17,290
Total	129,436	46,264	72,059	40,542	288,301
Percent	45	16	25	14	

SOURCE: West and Huecker 1992a.

From 1984 to 1986, the Forest Sciences Laboratory in the Juneau, Alaska office conducted a study of landslides that have occurred on the Tongass National Forest. The study focused on areas where timber harvest and road construction occurred. Only landslides that could be accessed from the existing road system were studied. The following data (Tables 3-13 through 3-17) summarizes the findings concerning 65 landslides found in the Project Area and included in the Forest Sciences Laboratory study.

Table 3-13
Number of Landslides in Project Area (by VCU)

VCU	No. of Landslides
233	4
236	15
239	14
243	6
244	24
245	2
Total	65

SOURCE: Swanston 1991.

Table 3-14
Number of Landslides in Project Area (by Landform)

	Number of Landslides	Landform No.	Description
	20	31	Deeply incised mountain slopes, frequently dissected.
	18	32	Shallowly incised mountain slopes, frequently dissected.
	7	35	Smooth mountain slopes, infrequently dissected.
	2	36	Broken mountain or hill slopes.
	9	43	Frequently dissected hill slopes.
	9	52	Frequently dissected footslopes and alluvial fans.
Total	65		

SOURCE: Swanston 1991.

Table 3-15
Number of Landslides in Project Area (by Slope Breakdown)

	Number of Landslides	Slope Breakdown by Percentage
	18	100 or greater
	19	75 to 99
	13	50 to 75
	7	Less than 50
	8	Not recorded in the study
Total	65	

SOURCE: Swanston 1991.

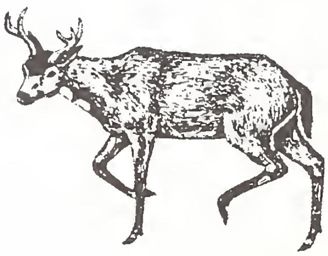


Table 3-16
Number of Landslides in Project Area (by Situation)

	Number of Landslides	Situation
	50	In areas that have been clearcut.
	8	In areas that have not been cut.
	5	Above the back line of a clearcut area.
	2	In conjunction with roadways.
Total	65	

SOURCE: Swanston 1991.

Table 3-17
Number of Landslides in Project Area (by Parent Material)

	Number of Landslides	Parent Material
	36	Granite
	18	Till
	2	Marble
	8	Metased (blue/gray clay)
	1	Parent material not recorded
Total	65	

SOURCE: Swanston 1991.

Vegetative root systems (tree roots in particular) have a stabilizing effect on slopes. When trees are cut, decomposing tree roots tend to decrease significantly in strength 5 to 7 years after harvest. This results in an increased likelihood of soil mass movement on steep slopes. Furthermore, the roots of uprooted trees disturb the soil mantle whenever windthrow occurs. Under natural conditions, windthrow is an important triggering device of debris avalanches and debris flows in Southeast Alaska. The degree of predictability is complicated by an interaction of factors such as soil depth, texture, and coarse fragment content.

Landslides occur often on steep slopes after a heavy rainfall

Water and Fish

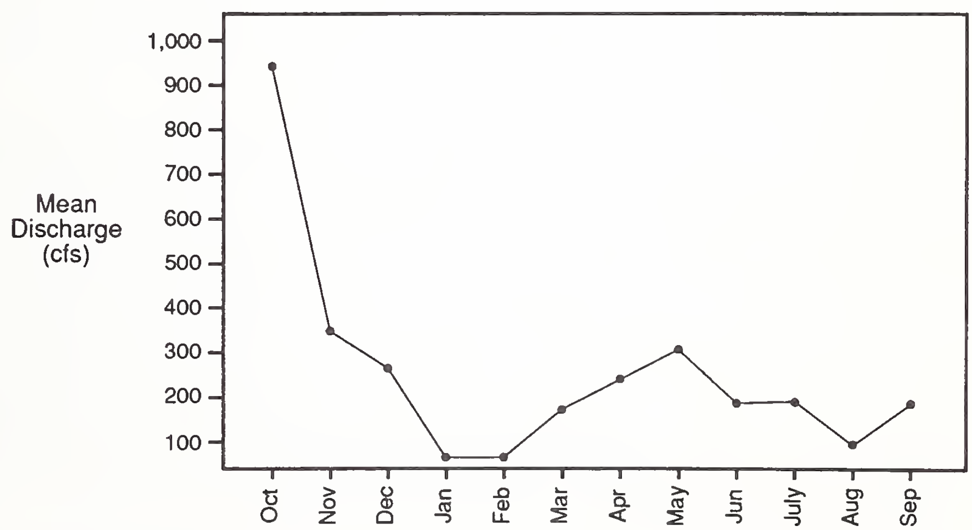
This description of water resources in the Southeast Chichagof Project Area is divided into the following subject areas: climate and stream flow regimen, water quality, and water use.

Climate and Stream Flow Regimen

Temperature and precipitation in the Southeast Chichagof area are strongly influenced by maritime climatic factors. Rainfall and snowfall in the area are very high because of frequent low pressure cells that move across Baranof Island and up Chatham Strait from the Gulf of Alaska. Average annual precipitation in the Project Area ranges from 80 inches on the shoreline of Tenakee Inlet to 120 inches in the Moore Mountains (Forest Service 1979d).

Runoff regimens for watersheds in the Project Area are typical of island watersheds in Southeast Alaska. The monthly hydrograph for Kadashan River for water year (WY) 1979, shows the typical runoff distribution for a watershed in the Southeast Chichagof area (Figure 3-1). Unit runoff from Kadashan range from 4.7 cubic ft/sec/mi^2 in June to 25.4 cu ft/sec/mi^2 in October of WY 1979. Maximum stream discharge occurs between October and November, with a second seasonal peak in May. Low flows generally occur between June and August and also during prolonged winter cold snaps when weather patterns are dominated by strong Arctic high pressure cells that move in from the Canadian interior. Winter stream freshets may result from warm rain or snow events. These events have the most potential effects on watersheds with southeast exposures and elevations less than 500 feet. Winter snow pack is typical for northern Southeast Alaska stream systems. A springtime increase in flow is typical because of seasonal snow melt runoff.

Figure 3-1
Kadashan Mean Monthly Flow for Water Year 1979.



SOURCE: Paustian 1987.

Water Quality and Properties

The physical and chemical properties of water are important factors in determining potential water use. In the Southeast Chichagof Project Area the most significant existing water use is for the natural propagation of fish and shell fish. No industrial or commercial water use is currently taking place. Key water quality parameters are identified in the State of Alaska water quality criteria for maintaining natural productivity of streams, lakes, and estuary aquatic life. These parameters include fine sediment and turbidity, pH, temperature, dissolved oxygen, and dissolved solutes.

Watershed condition and water quality for the majority of drainage basins in the Southeast Chichagof Project Area can be characterized as good. Stream chemical constituents and water temperatures for all drainages in the Southeast Chichagof area are within standards established for the growth and propagation of fish by Alaska State water quality criteria (ADEC 1989). Sedimentation is not a significant problem in most of the Southeast Chichagof area watersheds. Corner Creek and Kook Creek riparian areas have been affected by past logging activities. Spawning gravel quality currently does not appear to be impaired in these watersheds; however, fish habitat diversity and channel stability have been affected by historic riparian harvesting and road construction activities. Riparian condition, channel stability, and fish habitat condition of most watersheds in the Southeast Chichagof area can be characterized as good to excellent.

Sediment

Sediment concentration in the water column and intrusion of fine sediment into spawning gravel are important factors influencing aquatic productivity. Alaska water quality standards require that turbidity (a measure of suspended sediment) not exceed 25 nephelometric turbidity units (NTU) over natural conditions for propagation of fish. It also requires that fine sediment (0.1 mm to 4.0 mm) concentration may not increase by more than 5 percent or exceed a total of 30 percent by weight in stream gravels (ADEC 1989).

Natural suspended sediment concentrations in Kadashan and Indian River watersheds are typically low. The U.S. Geological Survey (USGS) measured an average of 6.9 mg/l for the Kadashan River. A small undisturbed second order tributary in Kadashan produced an annual sediment yield of 0.08 tons/acre; suspended sediment ranged from 1 mg/l to 4 mg/l. After road construction activity, the same watershed produced 0.12 tons/acre in annual sediment yield (Paustian 1987).

Prior to harvest, Indian River was monitored for 2 years by the Forest Service. In 1978, total sediment yield was 475 tons; for 1979, the yield was 1103 tons, 0.07 tons/acre and 0.16 tons/acre, respectively. Post-harvest monitoring showed 796 tons for 1980 and 979 tons for 1981, 0.11 tons/acre and 0.14 tons/acre, respectively (Paustian 1987). Suspended sediment values in Indian River during the study period ranged from 0.19 mg/l to 175 mg/l and turbidity values ranged from less than 1 to 65 NTU. Natural sediment concentrations in nonglacial watersheds commonly exceed 100 mg/l during fall flood events (Forest Service 1990a).

No data relating to fine sediment concentrations in stream gravels are available for Southeast Chichagof watersheds. However, those watersheds dominated by granitic rock types are likely to have naturally high concentrations of fines in gravel substrate. This is because of the high proportion of sand-size sediment particles that result from weathering of granitic rock.

Water Temperature

Stream temperature is a very important factor regulating biologic functions in the aquatic environment. Metabolic activities of most stream organisms are controlled by water temperature. State water quality standards (ADEC 1989) have established upper temperature limits between 13 and 15 degrees Celsius (°C) for propagation of fish. No standards have been established for cumulative temperature changes. High stream temperatures are unlikely to be a significant concern for Southeast Chichagof area streams.

Stream temperatures for Kadashan River for WY 1979 ranged from a minimum of 1.0°C to a maximum of 16.5°C. Other data from proximal watersheds show summer maximum temperatures ranging from 11.5°C to 15.0°C (Table 3-18). Summer temperatures measured for the main-stem of Kadashan ranged from a minimum of 6.5°C to a maximum of 16.5°C. These maximum temperatures are of short time intervals, depending upon the duration of warm, dry weather. No high-temperature sensitive streams have been identified in the Southeast Chichagof Project Area.

Table 3-18

Summary of USGS Temperature Data for Kadashan and Indian River

	Mean Temp°C	Maximum°C	Minimum°C	Period of Record
Kadashan (Main)	5.1	17.0	0.0	1967-1979
Kadashan (above Hook Creek)	5.9	28.5	0.0	1968-1983
Hook Creek	4.9	13.5	0.0	1978-1979
Tonalite Creek	4.9	11.0	0.0	1968-1983
Indian River	2.7	10.5	0.9	Jan-Oct 1981

SOURCE: Kelliher and Paustian 1992.

Stream Chemistry

Dissolved solute concentration is an important indicator of basic stream nutrient capital. Dissolved solids concentrations of surface waters in the Southeast Chichagof Project Area are well within State water quality limits.

Fish

The Project Area contains streams which vary in size from small muskeg trickles to large fluvial rivers. Relatively few large lakes are found in the area, but numerous small lakes and ponds are present. There are approximately 296 miles of Class I streams—stream channels that are accessible to anadromous fish; there are 195 miles of Class II streams—stream channels that have a steep gradient, generally only contain resident fish populations, but may contain potential anadromous fish habitat. Figures 3-2 and 3-3 display the individual watersheds located in the Project Area. The area also has approximately 3,326 acres of "upland" estuaries or intertidal zone (that area from low tide to the highest tide) and more than 4,680 acres of marine littoral zone (from low tide to 60-foot-deep water). There are about 1,598 acres of lakes and many acres of ponds. The vast freshwater, marine, and terrestrial ecosystems combined with complex physical and biological components result in great biological diversity and production within the area.

Four species of salmon (pink, chum, coho, and sockeye), two species of trout (cutthroat and rainbow), and one char (Dolly Varden) occur in area lakes and streams. King salmon are known to occur in marine waters within the area. Dolly Varden char, cutthroat, and rainbow trout are present in both resident and anadromous forms.

Crab, shrimp, scallops, clams, mussels, and various marine fish are associated with the estuaries and surrounding waters. Salmon and anadromous trout are dependent on estuaries during early life stages. Herring and other important saltwater fish use these areas for spawning and feeding.

Table 3-19 summarizes the waters of the Southeast Chichagof Project Area by VCU, miles of Class I stream available to anadromous fishes, acres of lakes, numbers of fish from peak counts and pounds of crab harvested (USFS and AFDG, Unpublished data). Table 3-20 provides a more detailed analysis of Project Area streams.

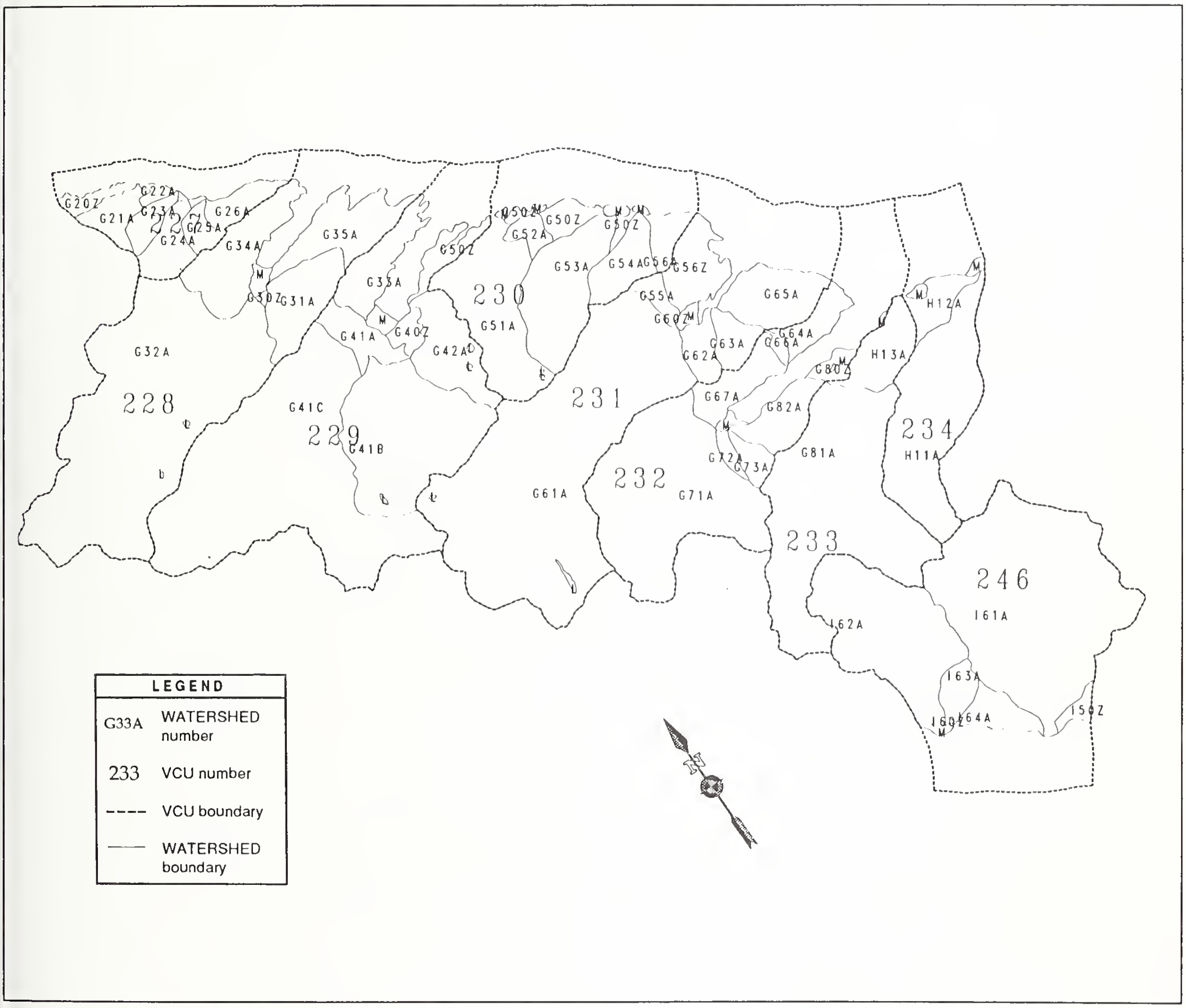
Table 3-19
Summary of Southeast Chichagof Project Area Waters

VCU	Miles Class I Streams* (miles)	Lakes (acres)	Pink Salmon	Chum Salmon	Sockeye Salmon	Dungeness Crab (lbs)
			(——— peak counts		———)	
227	3.25	0	---No Data---			
228	12.20	18	80,000	35,000	0	4,300
229	19.18	41	101,000	49,000	0	13,200
230	11.20	14	25,000	6,000	0	--
231	18.38	0	80,000	12,300	0	1,880
232	8.17	0	19,000	7,500	0	--
233	9.73	0	22,000	2,000	0	--
234	8.94	0	12,000	500	0	--
236	15.54*	0	18,000	3,000	0	--
239	17.93	603	30,700	600	2,500	--
240	12.90	154	3,100	0	300	--
241	5.71	103	1,000	0	0	--
246	17.05	0	135,000	50	0	--

SOURCE: Starostka 1992.

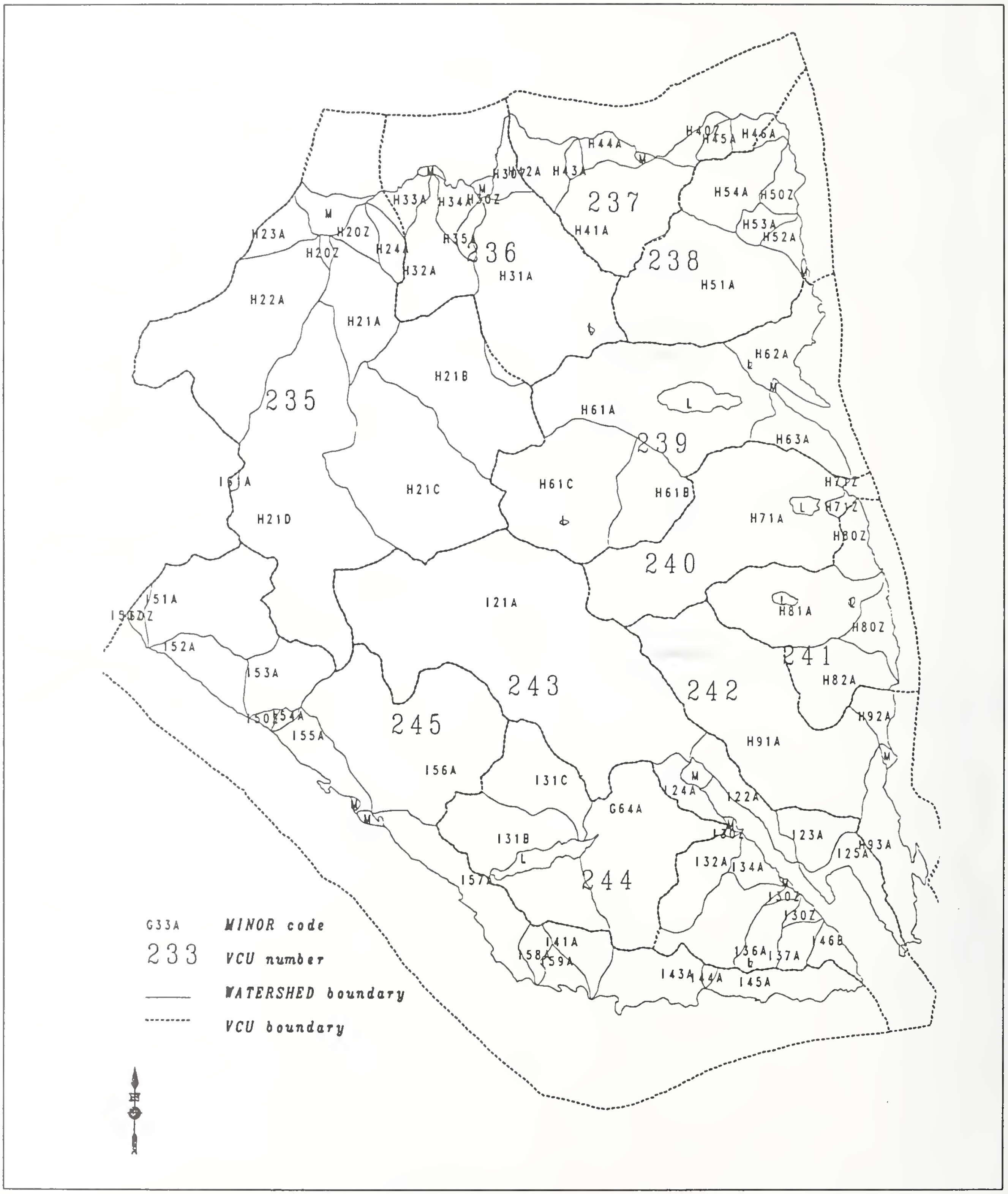
* Includes habitat made available by two fishpasses.

Figure 3-2
Watershed Minor Areas (VCUs 228, 229, 230, 231, 232, 233, 234, 246)



SOURCE: Kelliher and Paustian 1992.
Map developed on Chatham Area GIS

Figure 3-3
Watershed Minor Areas (VCUs 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245)



SOURCE: Kelliher and Paustian 1992.
Map developed on Chatham Area GIS

Table 3-21
Summary of Southeast Chichagof Project Area Streams

VCU	ADF&G Stream Number	Name	Watershed Number	Miles Class I	Miles Class II
227			G21A	1.7	0.6
			G22A	0.1	0.4
			G23A	0.4	0.9
			G24A	0.5	1.0
			G25A	0.2	1.4
			G34A	0.3	1.0
	Total			3.2	5.3
228			G31A	0.8	0.0
	112-47-010	Long Bay Creek	G32A	9.6	9.5
			G33A	1.4	0.0
			G34A	0.4	0.3
	Total			12.2	9.8
229	112-46-009	Seal Bay Creek	G41A,B,C	18.2	15.8
	112-46-004		G42A	1.0	2.1
	Total			19.2	17.9
230	112-45-036	Vaccinium Creek	G51A	5.6	0.7
			G52A	1.1	0.2
	112-45-032	Eaton Creek	G53A	3.3	2.5
			G54A	0.7	1.4
			G56A	0.5	0.0
	Total			11.2	4.8
231			G55A	0.0	0.8
	112-44-010	Saltery Bay Creek	G61A	16.0	10.8
			G62A	0.5	0.8
			G63A	0.2	0.6
			G64A	1.1	0.2
			G65A	0.6	0.3
	Total			18.4	13.5
232			G66A	0.0	0.4
			G67A	0.3	0.7
	112-43-010	Crab Bay Creek	G71A	5.9	10.5
	112-43-008		G72A	0.6	0.0
			G73A	0.7	1.2
			G82A	0.7	0.5
	Total			8.2	13.2
233	112-43-002	South Crab Creek	G81A	9.7	8.6
			H13A	0.0	1.1
	Total			9.7	9.7

Table 3-21 (continued)
Summary of Southeast Chichagof Project Area Streams

VCU	ADF&G Stream Number	Name	Watershed Number	Miles Class I	Miles Class II
234	112-42-032	Fog Creek	H11A	7.5	1.6
			H12A	1.40	0.0
	Total			8	1.62
235		Kadashan	H21A-D	33.7	9.4
236	112-42-016	Corner Bay Cr.	H31A	10.13	1.5
	112-42-020	Muri Creek	H32A	2.4	1.1
			H33A	0.	0.0
			H34A	0.5	0.0
			H35A	0.7	0.0
	Total			14.6	2.6
237		Trap	H41A	6.0	1.4
238		Buckhorn	H51A	13.4	0.3
239	112-12-025	Kook Lake	H61A,B,C	17.9	10.2
			H62A	0.0	1.3
			H63A	0.0	0.4
	Total			17.9	11.8
240	112-12-016	Basket Lake	H71A	12.9	4.6
241	112-12-012	Little Basket L.	H81A	3.4	3.0
	112-12-008		H82A	2.3	1.9
	Total			5.7	4.9
242		Whiterock	H91A	4.2	9.4
243		Sitkoh	I21A	38.6	10.5
244		Sitkoh Lake	G64A	16.5	16.0
245		False Island	I56A	23.5	43.5
246	113-51-001	Broad Creek	I61A	8.6	10.5
	113-55-005	Broad-Finger Cr.	I62A	7.1	3.3
			I63A	1.4	1.0
			I64A	0.0	0.3
	Total			17.0	15.1
	Grand Total			296.06	194.87

SOURCE: Starostka 1992.

Wildlife

The wildlife goals for the Tongass National Forest are to provide a "continuing flow" of diversified habitats to meet the needs of a wide range of wildlife species. In accordance with U.S. Department of Agriculture policy (Forest Service 1982a), two management philosophies will be employed: 1) management indicator species; and 2) ecosystem management or management for species richness.

Ecosystem management requires that management programs be directed toward terrestrial plant communities which are important to all existing wildlife species known to occur within the Southeast Chichagof Project Area. To meet this goal, plant communities must be of different size, shape, and juxtaposition to provide habitat requirements for the full assortment of native wildlife species.

Landscape scale species have large seasonal or year-long home ranges and territories. These species are capable of using a wide variety of vegetative conditions and usually do not have just one critical or limiting season.

Community scale species generally have smaller home ranges and territories than the landscape species. These species show a high preference or requirement for a particular vegetative community or combination of communities. Sometimes a particular season of the year is considered critical or limiting, which greatly influences the overall population of a species.

Structural species require a specific or unique habitat element or site for their presence. An example is the bald eagle which has specific nesting requirements. Table 3-21 displays the selected wildlife species (Management Indicator Species, or MIS) that have been selected for the Project Area.

Table 3-21
Management-Indicator Species (MIS) and their Ecological Context

MIS	Ecological Context
Sitka black-tailed deer	Community
Brown bear	Landscape
Red squirrel	Community
River otter	Landscape
Brown creeper	Community
Marten	Community
Red-breasted sapsucker	Community
Hairy woodpecker	Community
Vancouver Canada Goose	Community
Bald eagle	Structural

SOURCE: Anderson 1991.

Management Indicator Species

MIS is a concept used to gauge compliance with the requirements of the National Forest Management Act (NFMA) for maintenance of population viability (the ability of a population to sustain itself naturally) and biological diversity and to establish management goals for species in public demand. MIS are vertebrate or invertebrate species whose population changes are used to indicate the effects of land management activities (Forest Service 1982). They are a planning tool to promote more effective management of wildlife and fish habitats on National Forest lands. Through the MIS concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represent the complexity of habitats, species, and associated management concerns.

Indicator species for this project include brown bear, Sitka black-tailed deer, bald eagle, marten, red-breasted sapsucker, hairy woodpecker, brown creeper, Vancouver Canada goose, river otter, and red squirrel.

Computer habitat suitability models were developed for all MIS by an interagency task group and are described in Suring et al. (1988). The specific version of the models that were used and the variables used in the models are identified in Appendix G.

Wildlife Analysis Areas

Much of the data in this section is analyzed by Wildlife Analysis Areas (WAAs). WAAs are management units delineated by the ADF&G. WAAs that have all or a part of them in the Project Area are 3308, 3309, 3627, 3628, 3629, and 3630 (see Figure 3-4). Table 3-22 displays the percent of the WAA that is in the Project Area and the percent of the WAA that has proposed actions with the corresponding VCUs involved. The percent of the WAA in the Project Area ranges from 8 to 100. The percent of the WAA in the Project Area that is under consideration for actions in any alternative ranges from 0 to 60.

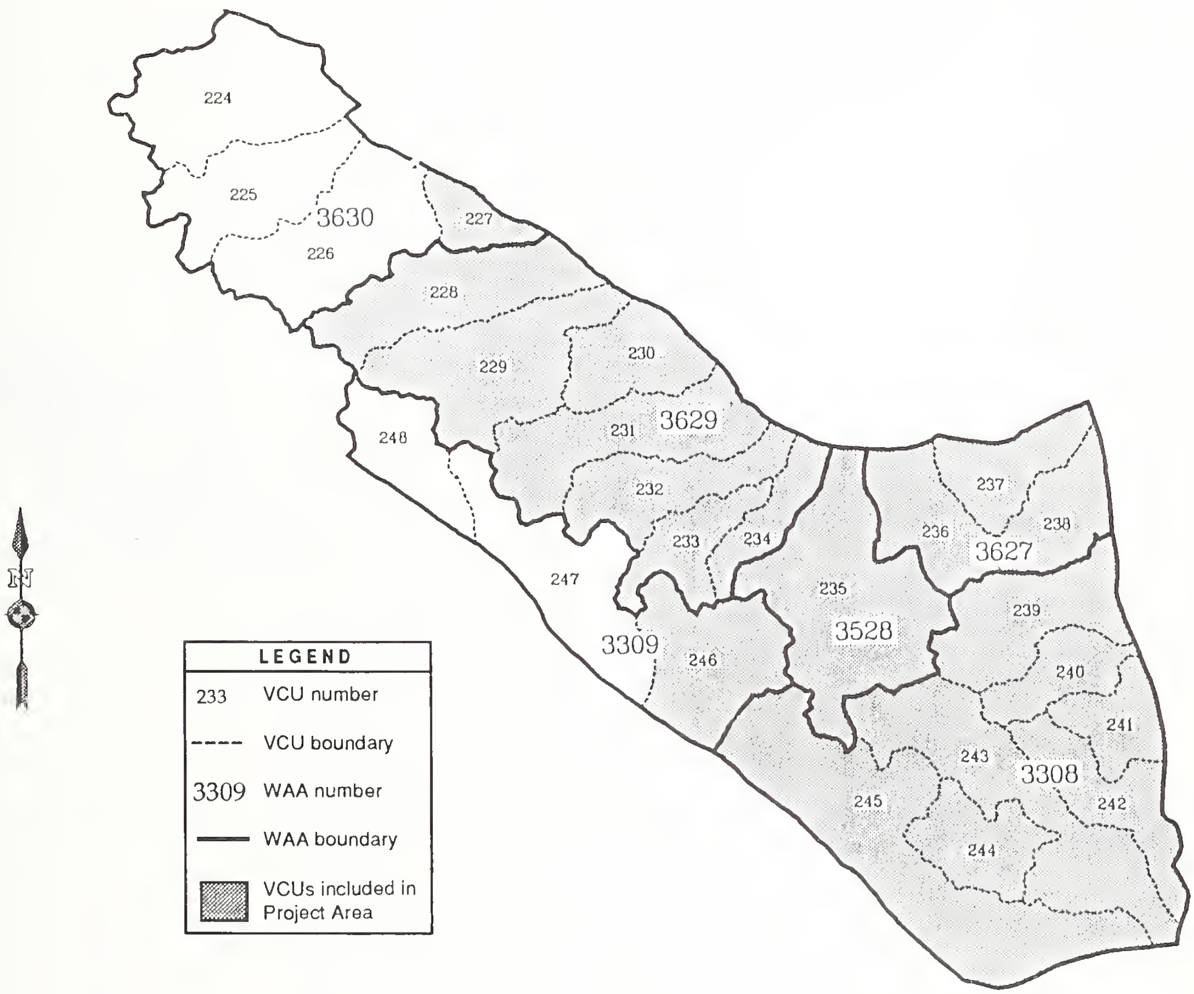
Table 3-22
Project Area WAAs Under Consideration for Activity

WAA Number	Percent of WAA in Project Area	VCUs in WAA	Percent of WAA Under Consideration	VCUs Under Consideration
3308	100	239, 240, 241, 242 243, 244, 245	26	239, 240, 241 245
3309	37	246, 24,7 248, 249	37	246
3627	100	236, 237, 238	37	236
3628	100	235	0	none
3629	100	228, 229, 230, 231, 232, 233, 234	60	230, 231, 232 233, 234,
3630	8	224, 225, 226, 227	0	none

SOURCE: Hartmann 1992a.

Note: Percent is based on VCU involvement, not actual proposed acres.

Figure 3-4
Wildlife Analysis Area



SOURCE: Anderson 1991.
Map developed on Chatham Area GIS.

Wildlife Habitats

Habitat refers to the kind of environment in which a species occurs. This environment can be described in physical or biological terms and often includes elevation, topographic position, or type of vegetative community. A wildlife species may occupy a range of different habitats or more than one distinctive kind of habitat in different seasons. Habitats that were inventoried in the Project Area include beach fringe, estuary fringe, streamside riparian, old growth, inland wetland, alpine/subalpine, and forested. An acreage inventory of each habitat by VCU is included in Table 3-23. These particular habitat types were inventoried because of specific attributes or management concerns in relationship to MIS species. The inventory was obtained from the Chatham Area GIS.

Table 3-23

Wildlife Habitat Existing Prior to Recorded Timber Harvest (in acres)

WAA	VCU	Beach Fringe	Estuary Fringe	Inland Wetland	Alpine	Stream Riparian	Old Growth	Forested
3308	239	499	281	264	2,706	605	10,245	13,777
	240	100	0	148	2,498	1,090	4,787	6,969
	241	293	0	155	1,981	490	4,509	6,036
	242	479	450	0	1,957	307	7,315	9,883
	243	1,108	1,094	0	5,718	585	17,200	23,402
	244	14	49	336	2,577	875	7,459	10,533
	245	1,411	502	26	8,487	1,080	15,186	19,680
WAA Total		3,904	2,376	929	25,924	5,032	66,701	90,280
3309	246	287	304	0	6,097	779	7,905	13,700
WAA Total*		287	304	0	6,097	779	7,905	13,700
3627	236	349	585	15	2,337	349	8,355	9,954
	237	498	323	67	1,859	120	4,195	5,374
	238	250	180	0	3,640	726	6,598	7,373
WAA Total		1,097	1,088	82	7,836	1,195	19,148	22,701
3628	235	455	697	102	5,607	1,939	20,898	28,045
WAA Total		455	697	102	5,607	1,939	20,898	28,045
3629	228	801	0	15	7,765	533	6,052	12,039
	229	742	915	25	8,567	897	7,880	15,814
	230	407	818	0	2,546	388	4,812	7,146
	231	596	1,210	85	6,338	941	7,460	12,131
	232	627	55	0	3,324	526	5,542	8,072
	233	210	423	0	2,857	373	5,033	8,438
	234	145	319	0	1,534	255	3,575	5,261
WAA Total		3,528	4,540	125	32,931	3,913	40,354	68,901
3630	227	384	419	0	813	208	1,483	3,270
WAA Total*		384	419	0	813	208	1,483	3,270
Project Totals		9,655	9,424	1,238	79,208	13,066	156,489	226,897

SOURCE: Anderson 1991.

* The VCUs listed in these WAAs represent only part of the WAA.

Beach Fringe

Beach fringe habitat is defined as areas of land within a 500-foot slope distance inland from the shoreline along the entire coastline. To avoid duplication, the area of land already within the estuary fringe is not included. These areas are transition zones between land and water, salt water and fresh water, and vegetated and nonvegetated conditions (Forest Service 1979c). Forested areas in this transition zone receive heavy use by species which have high economic, recreational, subsistence, or aesthetic values. Brown bear, river otter, bald eagle, marten, black-tailed deer, and the Vancouver Canada goose are typical species that concentrate their activities during some or all seasons in these forest stands. Many of these species exhibit a preference for, or dependence upon, mature/overmature forest stands.

Table 3-23 indicates that approximately 9,655 acres of beach fringe habitat existed in the Southeast Chichagof Island Project Area prior to any recorded timber harvest. Table 3-24 shows the acres of beach fringe existing today to be 8,367 acres. Approximately 87 percent of the original acres have not been affected by harvest activities.

Estuary Fringe

Estuary fringe is defined as those areas which are predominately intertidal and those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea where the salt water is diluted with fresh water. Estuary wetlands comprise about 1 percent of the mapped wetland acres.

Bears, waterfowl, furbearers, and bald eagles are all primary users of estuary fringe habitat. Although timber harvest activities within the actual estuary habitat have been minimal, it is the timbered zone bordering this habitat that is evaluated here. The estuary fringe is that 1,000-foot slope distance timbered zone around estuary areas was identified in the TLMP Wildlife Task Force Working Report (Forest Service 1979c) and was used in the 1986 to 1990 FEIS (Forest Service 1986c) to quantify alteration of habitat. The forested estuary fringe is similar to beach fringe; however, estuary fringe has a greater value to wildlife, especially to brown bears, river otters, bald eagles, and waterfowl.

Table 3-23 indicates approximately 9,424 acres of estuary fringe habitat existed in the Southeast Chichagof Project Area prior to any recorded timber harvest. Table 3-24 indicates that approximately 8,534 acres of estuary fringe habitat currently exist in the Project Area. Approximately 91 percent (Table 3-25) of the estuary acres in the Project Area are not affected.

Inland Wetlands

These areas are not necessarily wetlands as defined by the USFWS. Rather, inland wetland is considered as forested areas within 500 feet of low-elevation lakes, beaver ponds, marshlands, and associated grass/sedge meadows that are larger than 10 acres. These sites are especially important for bears, furbearers, certain waterfowl, and a variety of other birds. Areas inventoried for the inland wetland habitat did not include many small wetland areas that account for much of the existing wetlands acreages.

Table 3-23 indicates that approximately 1,238 acres of inland wetland existed in the Project Area prior to any recorded timber harvest. Of that total, approximately 1,160 acres or 94 percent (Table 3-25) remain unaffected by harvest activities.

Alpine/Subalpine

Alpine/subalpine is upland area over 1,500 feet in elevation. These areas consist largely of alpine meadows, rock, slides, and unproductive forest or shrub cover. This habitat is seasonally important to brown bear and deer. Table 3-24 indicates that approximately 79,208 acres of alpine/subalpine habitat currently exist in the Project Area. This habitat for the most part has not been affected by harvest activities.

Table 3-24
Wildlife Habitat Existing After SEIS Scheduled Timber Harvest (in acres)

WAA	VCU	Beach Fringe	Estuary Fringe	Inland Wetland	Alpine	Stream Riparian	Old Growth	Forested
3308	239	464	266	232	2,706	387	8,161	13,777
	240	100	0	148	2,498	1,090	4,783	6,969
	241	138	0	155	1,981	485	3,725	6,036
	242	461	420	0	1,957	297	5,540	9,883
	243	777	903	0	5,718	321	13,114	23,402
	244	14	49	333	2,577	590	5,177	10,533
	245	986	362	26	8,487	320	11,084	19,680
WAA Totals		2,940	2,000	894	25,924	3,490	51,584	90,280
3309	246	287	304	0	6,097	779	7,863	13,700
WAA Total*		287	304	0	6,097	779	7,863	13,700
3627	236	258	525	12	2,337	180	6,204	9,954
	237	498	323	67	1,859	120	4,195	5,374
	238	250	180	0	3,640	726	5,500	7,373
WAA Totals		1,006	1,028	79	7,836	1,026	15,899	22,701
3628	235	455	690	62	5,607	1,921	20,372	28,045
WAA Total		455	690	62	5,607	1,921	20,372	28,045
3629	228	801	0	15	7,765	533	6,052	12,039
	229	742	915	25	8,567	897	7,575	15,814
	230	397	783	0	2,546	370	4,515	7,146
	231	511	1,020	85	6,338	893	7,134	12,131
	232	513	675	0	3,324	483	5,274	8,072
	233	186	381	0	2,857	337	4,746	8,438
	234	145	319	0	1,534	239	3,049	5,261
WAA Totals		3,295	4,093	125	32,931	3,752	38,345	68,901
3630	227	384	419	0	813	208	1,48	3,270
WAA Total*		384	419	0	813	208	1,483	3,270
Project Totals		8,367	8,534	1,160	79,208	11,176	135,546	226,897

SOURCE: Anderson 1991.
* The VCUs listed in these WAAs only represent part of the WAA.

Table 3-25
Percent Wildlife Habitat Harvested

WAA	VCU	Beach Fringe	Estuary Fringe	Inland Wetland	Alpine	Stream Riparian	Old Growth	Forested Acres
3308	239	7	5	12	0	36	20	13,777
	240	0	0	0	0	0	0	6,969
	241	43	0	0	0	1	17	6,036
	242	4	7	0	0	3	24	9,883
	243	30	17	0	0	45	24	23,402
	244	0	0	1	0	33	31	10,533
	245	30	28	0	0	70	27	19,680
WAA Totals		25	16	4	0	31	23	90,280
3309	246	0	0	0	0	0	1	13,700
WAA Total*		0	0	0	0	0	1	13,700
3627	236	26	10	20	0	48	26	9,954
	237	0	0	0	0	0	0	5,374
	238	0	0	0	0	0	17	7,373
WAA Total		8	6	4	0	14	17	22,701
3628	235	0	1	39	0	1	3	28,045
WAA Total		0	1	39	0	1	3	28,045
3629	228	0	0	0	0	0	0	12,039
	229	0	0	0	0	0	4	15,814
	230	2	4	0	0	5	6	7,146
	231	14	16	0	0	5	4	12,131
	232	18	21	0	0	8	5	8,072
	233	11	10	0	0	10	6	8,438
	234	0	0	0	0	6	15	5,261
WAA Total		7	10	0	0	4	5	68,901
3630	227	0	0	0	0	0	0	3,270
WAA Total*		0	0	0	0	0	0	3,270
Project Totals		13	9	6	0	14	13	226,897

SOURCE: Anderson 1991.

* The VCUs listed in these WAAs only represent part of the WAA.

Streamside Riparian

This habitat is recognized as some of the most diverse and productive habitat in Southeast Alaska. It occurs along streamcourses and is extremely important for eagles, furbearers, and brown bears. The Southeast Chichagof Project Area has approximately 265 miles of stream channels classified as either Class I or Class II. Table 3-23 indicates that approximately 13,066 acres of streamside riparian habitat existed in the Project Area prior to recorded timber harvest. Table 3-24 indicates that approximately 11,176 acres or 86 percent of the Project Area streamside riparian acres exist today unaltered.

Old-growth Forests

Much of the forest in the Southeast Chichagof Project Area can be considered old growth because, for the most part, it has been unaffected by timber harvest, windthrow, or fires. Old-growth forest is characterized as stands of trees which are usually well past the age of maturity and with declining growth rates and signs of decadence, such as dead and dying trees, snags, and downed woody material. The stand usually includes large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the notable presence of understory vegetation. These forests are in a dynamic, steady state where the death of old trees is balanced by the growth of new trees. Table 3-23 shows that approximately 156,489 acres of old growth existed in the Project Area prior to any recorded timber harvest. Table 3-24 indicates that 135,546 acres of old-growth habitat, or approximately 87 percent (Table 3-25) currently exist in the Project Area and include acres that may occur in the beach fringe, estuary fringe, or other of the habitat areas.

Old–growth Sitka spruce and western hemlock

Forested

This habitat includes all areas with forest cover, including both CFL and non-CFL forest land. All habitat types discussed above occur partially or entirely within forested habitat areas. Forested habitat is presented to disclose overall effects of management activities on wildlife in general. Table 3-24 indicates that approximately 226,897 acres of forested habitat exists in the Project Area.

The 1986 to 1990 FEIS included mapping and designating land as providing old-growth habitat. These areas were re-evaluated using the GIS models to portray high habitat, old-growth acres for the Sitka black-tailed deer, brown bear, marten, and bald eagle. Twenty-nine percent of existing old growth is protected by a prescription that will allow no timber harvest unless the stated management direction is modified after further NEPA analysis and public disclosure (Table 3-26).

Habitat Capability For the Management Indicator Species

Habitat Suitability Index (HSI) models assume that habitat factors such as vegetation, soils, and surface water features can be identified as characteristics which influence an area's ability to supply a wildlife species with its life requisites. HSI models developed during the revision of TLMP and designed to run on the GIS were used to quantify habitat quality for the MIS.

The models are considered suitable in project planning to describe the quality of MIS habitat and compare effects of alternative management prescriptions. These HSI models were developed cooperatively by the Forest Service, ADF&G, and USFWS biologists, but have not been extensively field verified for accuracy. Despite the lack of verification at this time, the HSI models are the best tool available for identifying and quantifying habitat values for MIS.

Sitka Black-tailed Deer

Sitka black-tailed deer range through all major habitats in the Project Area. They represent species using lower elevation, old-growth forest habitats during the winter. Winter is recognized as the limiting factor for deer and numerous other species in Southeast Alaska.

Deer rely heavily on forested habitats for cover, and much of their feeding is in forested areas. In summer, the deer range through all elevations, including alpine meadows and subalpine forests. They also feed in clearcuts where forage is plentiful. Winter snows drive them to lower elevations and deep snow forces them to the beach fringe.

Results of the deer model indicate that habitat in the Project Area is capable of supporting 7,412 deer (Table 3-27). This represents a 15 percent reduction in habitat capability since 1960. Table 3-27 shows habitat capability by VCU and by WAA at current conditions and, also, before 1960.

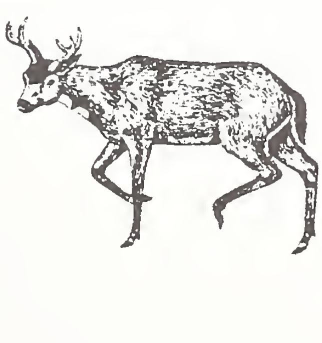


Table 3-26
Old-growth Habitat Condition Acres

VCU	Existing Old-growth Acres	TLMP Retention Acres *	Acres to be managed as Old-growth Habitat Condition **
227	1,483	105	830
228	6,052	0	3,145
229	7,575	0	3,752
230	4,515	466	883
231	7,134	429	1,910
232	5,274	227	1,294
233	4,746	94	535
234	3,049	315	723
235	20,372	2,296	9,679
236	6,204	671	1,691
237	4,195	435	2,177
238	5,500	644	941
239	8,161	1,400	1,609
240	4,783	95	919
241	3,725	604	1,187
242	5,540	1,263	2,552
243	13,144	1,089	1,941
244	5,177	279	283
245	11,084	872	2,325
246	7,863	220	978
Total	135,546	11,504	39,342
Percent of Existing Old Growth		8	29

SOURCE: Anderson 1991.

* Acres designated in TLMP to be retained.

** Acres delineated on Altemative Maps to be managed this Planning Period.

Table 3-27
Sitka Black-tailed Deer Populations Based on a Habitat Capability Model

WAA	VCU	Number of Sitka Black-tailed Deer Pre-1960	1992	% Change
3308	239	623	427	(31)
	240	286	286	0
	241	280	237	(15)
	242	451	369	(18)
	243	1,075	855	(20)
	244	507	328	(35)
	245	995	658	(34)
Total		4,217	3,160	(25)
3309	246	420	420	0
Total		420	420	0
3627	236	430	372	(13)
	237	226	226	0
	238	356	322	(10)
	Total	1,012	920	(11)
3628	235	1,101	1,093	(1)
	Total	1,101	1,093	(1)
3629	228	219	219	0
	229	280	275	(2)
	230	245	217	(11)
	231	417	398	(5)
	232	316	292	(8)
	233	274	248	(9)
	234	194	149	(23)
	Total	1,945	1,798	(7)
3630	227	42	42	0
	Total	42	42	0
Grand Total		8,737	7,433	(15)

SOURCE: Anderson 1991.

( ) indicates a negative percent.

Brown Bear

Brown bear use sea level to alpine habitat and require large areas for habitat use and protection from human disturbance. The distribution of bears corresponds closely to the seasonal abundance and quality of food available. In Southeast Alaska, old-growth forest is used extensively by brown bears for foraging, cover, and denning.

The late summer season has been identified as the most critical or limiting period for brown bear (Schoen and Beier 1989). During this season, bears concentrate along low-elevation valley bottoms and coastal salmon streams. These are also areas of greatest human use as well as areas where the most intense resource development activities occur. The brown bear model evaluates the habitat capability during this critical late-summer season. Variables include location, vegetation, and fish abundance. The model indicates that there is habitat capable of supporting 393 bears in the Project Area (Table 3-28). This is a 6 percent decline in habitat capability since 1960.

Alpine habitat is important summer habitat for brown bear.

Table 3-28
Brown Bear and Red Squirrel Populations Based on Habitat Capability Models

WAA	VCU	Number of Brown Bears Pre-1960	1992	% Change	Number of Red Squirrels Pre-1960	1992	% Change
3308	239	26	23	(12)	13,603	12,445	(9)
	240	13	13	0	7,039	7,039	0
	241	10	10	0	6,102	5,695	(7)
	242	16	14	(13)	9,664	8,896	(8)
	243	41	35	(15)	21,892	20,067	(8)
	244	17	15	(12)	9,854	8,141	(17)
	245	36	30	(17)	19,090	16,145	(15)
	Total	159	140	(12)	87,244	78,428	(10)
3309	246	25	25	0	11,127	11,147	0
	Total	25	25	0	11,127	11,147	0
3627	236	17	16	(6)	10,549	9,066	(14)
	237	10	10	0	6,018	6,018	0
	238	16	14	(14)	6,967	6,967	0
	Total	43	40	(7)	23,534	22,051	(4)
3628	235	51	51	0	26,989	26,845	(1)
	Total	51	51	0	26,989	26,845	(1)
3629	228	22	22	0	11,123	11,123	0
	229	32	31	(3)	14,215	14,046	(1)
	230	13	13	0	6,218	5,962	(4)
	231	29	28	(3)	11,049	10,888	(1)
	232	16	15	(6)	7,708	7,510	(3)
	233	14	14	0	7,421	7,265	(2)
	234	9	8	(11)	4,768	4,306	(10)
	Total	135	131	(2)	62,502	61,100	(2)
3630	227	6	6	0	2,601	2,601	0
	Total	6	6	0	2,601	2,601	0
Grand Total		419	393	(6)	213,997	202,172	(6)

SOURCE: Anderson 1991.
( ) indicates a negative percent.

Red Squirrel

Optimum habitat for red squirrels provides food sources, food-caching sites, and nesting cover (Vahle and Patton 1983). This includes forested stands with two or more species of conifers of cone-bearing age for food, snags for den sites, and downed logs for cache sites. These conditions are best provided in old-growth Sitka spruce forests in Southeast Alaska. Other forest types provide the life requirements of red squirrels but food resources are not as plentiful as found in spruce forests. Red squirrels represent a species that can do fairly well in second-growth timber stands at seed-producing age.

The squirrel model evaluates habitat capability based on elevation and vegetation. In the Project Area, the model indicates that there is suitable habitat capable of supporting 202,172 red squirrels (Table 3-28). This is a 6 percent decline in habitat capability since 1960.

River Otter

River otters are associated with both coastal and fresh-water aquatic environments and the upland habitats immediately adjacent. Habitat selection is also a product of food availability. Food items include fish, abalone, sea urchins, chitons, crabs, and other marine invertebrates; however, fish are generally the main food source.

Food availability and adequate cover are two factors which affect use of an area by otter. Specific data on otter food availability along the coast do not exist. Therefore, cover attributes are the only habitat parameter available for measuring habitat quantity and quality. The otter model evaluates habitat capability during the spring. This is based on location, vegetation, general fish abundance, and lake size.

The season of the year and the habitat factors most limiting to river otters have not been identified. Until more knowledge is obtained on what constitutes limitations for river otter in Southeast Alaska, the current model is considered the best tool for evaluating the effects of forest management activities. This model indicates that there is habitat in the Project Area capable of supporting 221 river otter (Table 3-29)—a 25 percent decline in capability from 1960.

Marten

Marten use old-growth forests, including beach fringe and riparian areas. Use of habitat by the marten is related to occurrence and availability of foods and cover. The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Marten also like Sitka black-tail deer use lower elevation, old-growth forest habitats during the winter.

The marten model evaluates the habitat capability during the critical winter season based on location and vegetation. The current model indicates that there is habitat capable of supporting 425 marten in the Project Area (Table 3-29). This is an 11 percent decline from 1960 habitat capability.

Hairy Woodpecker

The hairy woodpecker is an uncommon, permanent resident throughout Southeast Alaska; it requires habitats in old-growth forests with snags. Like the red-breasted sapsucker, the hairy woodpecker is a primary excavator. Snag quantity is directly related to the potential of an area to support hairy woodpeckers. The forest types and successional stages most favorable for nesting habitat have been identified through research and stand examinations in Southeast Alaska.

Winter roosting and foraging habitat are thought to be the limiting factor for resident cavity-nesting birds (Raphael & White 1984; Haapanen 1965). The hairy woodpecker model evaluates winter habitat capability based on vegetation and elevation. The model indicates that there is suitable winter habitat in the Project Area capable of supporting 2,558 hairy woodpeckers (Table 3-30). This is a 26 percent decline in hairy woodpecker habitat capability since 1960.

Table 3-29
River Otter and Marten Populations Based on Habitat Capability Models

		Number of River Otter			Number of Marten		
WAA	VCU	Pre-1960	1992	% Change	Pre-1960	1992	% Change
3308	239	20	13	(35)	33	26	(21)
	240	6	6	0	14	14	0
	241	7	6	(14)	14	12	(14)
	242	12	8	(33)	22	18	(18)
	243	31	17	(45)	51	40	(22)
	244	8	5	(38)	23	17	(26)
	245	26	14	(46)	43	30	(30)
	Total	110	69	(37)	200	157	(22)
3309	246	9	9	0	30	30	0
	Total	9	9	0	30	30	0
3627	236	12	3	(75)	26	21	(19)
	237	9	9	0	13	13	0
	238	20	9	(55)	15	15	0
	Total	41	21	(49)	54	49	(9)
3628	235	26	25	(4)	59	59	0
	Total	26	25	(4)	59	59	0
3629	228	14	14	0	21	21	0
	229	23	20	(13)	27	27	0
	230	9	8	(11)	14	13	(7)
	231	18	16	(11)	24	23	(4)
	232	12	10	(17)	17	16	(6)
	233	8	7	(13)	15	13	(13)
	234	5	4	(20)	10	8	(20)
	Total	89	79	(12)	128	121	(5)
3630	227	14	14	0	9	9	0
	Total	14	14	0	9	9	0
Grand Total		289	217	(25)	480	425	(11)

SOURCE: Anderson 1991.
( ) Indicates negative percent.

Table 3-30
Hairy Woodpecker and Bald Eagle Populations Based on Habitat Capability Models

WAA	VCU	Number of Hairy Woodpeckers Pre-1960	1992	% Change	Number of Bald Eagles Pre-1960	1992	% Change
3308	239	278	179	(36)	53	34	(36)
	240	97	95	(2)	18	18	0
	241	129	90	(30)	20	18	(10)
	242	187	115	(39)	30	24	(20)
	243	394	234	(41)	85	39	(54)
	244	212	102	(52)	21	13	(38)
	245	413	201	(51)	70	35	(50)
	Total	1,710	1,016	(41)	297	181	(39)
3309	246	100	98	(2)	27	25	(7)
	Total	100	98	(2)	27	25	(7)
3627	236	244	155	(36)	36	9	(75)
	237	106	106	0	26	26	(62)
	238	105	103	(2)	55	24	(56)
	Total	455	364	(19)	117	59	(50)
3628	235	421	409	(3)	77	74	(4)
	Total	421	409	(3)	77	74	(4)
3629	228	117	117	0	43	43	0
	229	162	145	(10)	69	60	(13)
	230	74	57	(23)	23	22	(4)
	231	139	122	(12)	53	46	(13)
	232	106	91	(14)	36	28	(22)
	233	82	67	(18)	24	20	(17)
	234	69	44	(36)	13	12	(8)
Total		749	643	(14)	261	231	(11)
3630	227	27	27	0	37	37	0
Total							
		27	27	0	37	37	0
Grand Total		3,462	2,557	(26)	816	607	(26)

SOURCE: Anderson 1991.
( ) Indicates negative percent.

Bald Eagle

Bald eagles are found throughout Southeast Alaska and are primarily associated with coastal habitats and inland riparian habitats. Bald eagles may also concentrate at feeding grounds in the spring. Throughout their range, bald eagles are opportunistic in their use of available food resources. Fish is their dietary mainstay in Southeast Alaska (Kalmbach et al. 1964).

Typical nesting habitat occurs along the coastline in old-growth forests with Sitka spruce trees comprising the majority of nest sites. Nest sites have been identified in the Project Area by the USFWS. Table 3-31 shows the number of inventoried eagle nest trees by VCU for the Project Area. Most of the data collected in Southeast Alaska have been on nesting habitat. The bald eagle model evaluates nesting habitat capability based on location, elevation, stream class, lake size, and vegetation. The current model indicates that there is suitable nesting habitat capable of supporting 607 eagles (Table 3-30). This is an 26 percent decline in habitat capability since 1960.

Table 3-31
Bald Eagle Nest Sites

VCU	Number of Nests	VCU	Number of Nests	VCU	Number of Nests
227	6	234	3	241	13
228	11	235	7	242	37
229	14	236	9	243	16
230	13	237	16	244	0
231	13	238	22	245	18
232	12	239	35	246	5
233	5	240	3		

Total number of eagle nest sites: 258

SOURCE: Anderson 1991.

Brown Creeper

The brown creeper is an uncommon, permanent resident throughout Southeast Alaska and is associated with large, old-growth trees. This species is most dependent on high-volume old growth where tree size is more important than species. Large diameter trees produce more beetle larvae per unit of surface area; thus, they facilitate feeding efficiency of brown creepers (Raphael and White 1984; Airola and Barrett 1985; Parker and Stevens 1979).

Winter habitat has been suggested as the limiting factor for cavity-nesting birds, including brown creeper (Raphael and White; Haapanen 1965). The brown creeper model evaluates the capability of winter habitat based on vegetation and elevation. The model indicates that there is suitable winter habitat in the Project Area capable of supporting 1,655 brown creepers (Table 3-32). This represents a 62 percent decline in habitat capability since 1960.

Red-Breasted Sapsucker

Red-breasted sapsuckers are summer residents which require old-growth forest habitats with snags. They are primary excavators because they excavate cavities for other cavity-using wildlife species. For this reason, they are considered a "keystone" species in Southeast Alaska (Sidle and Suring 1986).

Quantity of snags determines whether red-breasted sapsuckers will use an area. Although there is not a forest-wide inventory of snags, research and timber stand exams in Southeast Alaska have identified which forest types and successional stages provide the most favorable nesting habitat.

The red-breasted sapsucker model evaluates breeding habitat capability based on vegetation and elevation. The model indicates that there is suitable habitat in the Project Area capable of supporting 25,291 red-breasted sapsuckers (Table 3-32). This is an 8 percent decline in habitat capability since 1960.

Table 3-32
Brown Creeper and Red-breasted Sapsucker Populations Based on Habitat Capability Models

		Number of Brown Creepers			Number of Red-breasted Sapsuckers		
WAA	VCU	Pre-1960	1992	% Change	Pre-1960	1992	% Change
3308	239	464	118	(75)	1,888	1,654	(12)
	240	76	76	0	970	970	0
	241	229	78	(66)	815	725	(11)
	242	32	18	(44)	294	75	(74)
	243	607	88	(86)	3,112	2,727	(12)
	244	415	58	(86)	1,338	1,061	(21)
	245	751	80	(89)	2,555	2,030	(21)
	Total	2,574	516	(80)	10,972	9,242	(16)
3309	246	36	29	(19)	1,581	1,575	(0)
	Total	36	29	(19)	1,581	1,575	(0)
3627	236	424	167	(61)	1,869	1,613	(14)
	237	136	136	0	1,100	1,100	0
	238	21	21	0	143	138	(4)
	Total	579	324	(44)	3,063	2,856	(7)
3628	235	440	404	(8)	3,568	3,538	(1)
	Total	440	404	(8)	3,568	3,538	(1)
3629	228	53	53	0	1,245	1,243	(0)
	229	161	98	(39)	1,613	1,571	(3)
	230	67	19	(72)	986	945	(4)
	231	139	77	(45)	1,498	1,455	(3)
	232	79	62	(22)	1,058	1,021	(3)
	233	73	28	(62)	993	955	(4)
	234	101	26	(74)	636	572	(10)
	Total	673	363	(46)	8,029	7,762	(3)
3630	227	19	19	0	318	318	0
	Total	19	19	0	318	318	0
Grand Total		4,321	1,655	(62)	27,531	25,291	(8)

SOURCE: Anderson 1991.

( ) Indicates negative percent.

Vancouver Canada Goose

Vancouver Canada Geese, a year-round resident waterfowl species, use wetlands (both forested and nonforested) in the estuary, riparian, and upland areas of the forest. They are unique among all subspecies of Canada geese in that they use forested habitat for nesting and brood rearing (Lebeda et al. 1983).

Knowledge of year-round goose habitat requirements is very limited. Hanson (1962) indicated that nesting and brood rearing is probably the most limiting habitat factor. For this reason and the potential for effects from forest management activities, the goose model evaluates nesting and brood rearing habitat capability. Evaluation is on the basis of vegetation and location. The current model indicates that there is suitable habitat in the Project Area capable of supporting 662 Canada geese (Table 3-33). As a result of management activities, habitat capability declined by 6 percent since 1960.

Table 3-33
Vancouver Canada Goose Populations Based on a Habitat Capability Model

		Number of Canadian Geese		
WAA	VCU	Pre-1960	1992	%Change
3308	239	25	22	(14)
	240	25	25	0
	241	8	7	(14)
	242	29	25	(14)
	243	99	86	(14)
	244	40	34	(14)
	245	9	8	(14)
	Total	236	206	(13)
3309	246	74	74	0
	Total	74	74	0
3627	236	28	25	(11)
	237	15	15	0
	238	23	20	(13)
	Total	66	60	(9)
3628	235	87	86	(1)
	Total	87	86	(1)
3629	228	35	35	0
	229	37	36	(3)
	230	22	21	(3)
	231	25	24	(3)
	232	19	19	(3)
	233	22	21	(3)
	234	11	11	(3)
	Total	171	167	(2)
3630	227	69	69	0
	Total	69	69	0
Grand Total		703	662	(6)

SOURCE: Anderson 1991.

( ) Indicates negative percent.

Consumptive Use of Wildlife

Many of the wildlife species on the Tongass are important for subsistence and recreational hunting. An overview of the consumptive use of wildlife resources in the Project Area is presented here.

The Project Area WAAs lie within Game Management Unit 4, which is a much larger area that includes all of Baranof, Chichagof, Kruzof, and Admiralty islands. The larger game management units are delineated by the State for regulatory purposes.

Tables 3-34, 3-35, 3-67, and 3-37, display harvest data for the six WAAs (3308, 3309, 3627, 3630, 3628, and 3629) for deer, brown bear, river otter, and marten respectively.

Brown bear and other furbearers may be taken as a subsistence resource. Natives in the surrounding communities use the skins from brown bear, or fur from the marten or sea otter, for regalia costumes used in ceremony and dance.

Table 3-34
Deer Harvest Data

	WAA					
Year	3308	3309	3627	3628	3629	3630
1987	361	190	46	42	416	100
1988	186	161	111	71	232	31
1989	187	195	95	10	174	40
1990	160	371	76	33	127	39
Total	894	917	328	156	949	210
Mean	224	229	82	39	237	53

SOURCE: Anderson 1991.

Note: Information derived from ADF&G Hunter Survey Summary Statistics.

Table 3-35
Brown Bear Harvest Data

	WAA					
Year	3308	3309	3627	3628	3629	3630
1987	4	1	1	0	3	2
1988	1	2	2	0	6	2
1989	3	1	0	2	4	3
1990	8	8	1	4	3	3
Total	16	12	4	6	16	10

SOURCE: Anderson 1991.

Note: Information derived from ADF&G Hunter Survey Summary Statistics.

Table 3-36
River Otter Harvest Data

Year	WAA 3308	3309	3627	3628	3629	3630
1987	1	0	0	0	7	1
1988	0	8	1	0	1	0
1989	0	0	1	1	0	0
1990	0	0	0	0	0	0
Total	1	8	2	1	8	1

SOURCE: Anderson 1991.

Note: Information derived from ADF&G Hunter Survey Summary Statistics.

Table 3-37
Marten Harvest Data

Year	WAA 3308	3309	3627	3628	3629	3630
1987	7	1	13	0	4	2
1988	4	4	38	0	2	0
1989	7	2	0	0	1	0
1990	0	0	0	0	0	0
Total	18	7	51	0	7	2

SOURCE: Anderson 1991.

Note: Information derived from ADF&G Hunter Survey Summary Statistics.

Wildlife Population Objectives

In the spring of 1990, ADF&G developed preliminary population objectives for deer and brown bear for Southeast Alaska. In formulating these objectives, ADF&G compared three possible population levels for each WAA: 1) current hunter demand; 2) a 25 percent decline in long-term habitat capability from the 1954 level, and; 3) minimum viable population. In most cases, the highest of the three population levels was selected as the population objective.

The Forest Service and ADF&G have generally agreed to develop some draft population objectives acceptable to both agencies. That effort is currently underway. Species have been prioritized as follows for the purpose of developing population objectives: deer, brown bear, black bear, marten, and mountain goat. To date, only population objectives for Sitka black-tailed deer have been finalized (ADF&G 1991). Population objectives for Project Area WAAs are shown in Table 3-38.

Table 3-38
Deer Population Objectives for Project Area WAAs

WAA	Population Objective
3308	3,160
3309	960
3627	726
3628	1,093
3629	1,798

SOURCE: ADF&G 1991.

The ability of wildlife resources in the Project Area to meet the needs of subsistence and sport hunters and trappers depends on habitat capable of supporting population at sufficiently high levels to meet demand. As habitat capability declines, so do potential numbers of wildlife available for harvest. Habitat capability (for analysis purposes) is assumed to be an approximation of population levels.

In some Project Area WAAs, habitat capabilities even before 1960 would not have been considered sufficient to support current deer harvest levels. The possibility exists that a severe winter may result in a deer population drop. This is because existing deer winter range habitat will not support the current population under heavy snowfall conditions. This is a natural phenomenon in Southeast Alaska and is not necessarily associated with levels of timber harvest.

Biological Diversity

The Southeast Chichagof Project Area represents a diverse, relatively natural environment. The combination of fresh-water, marine, and terrestrial systems and the complex physical and biological components results in great biological diversity.

The Project Area is within the East Chichagof Island Province. Climatically this province is drier and colder than the outer coast of Chichagof Island. Winter snow pack is generally greater. The deep dissection of Freshwater Bay, Peril Straits, and Port Fredrick has created three peninsulas which could function biologically more like separate islands. The Project Area includes the majority of one of these peninsulas. This Project Area plays an important role in maintaining habitat, corridors, and viable populations of wildlife throughout the Tongass National Forest.

The Project Area contains a variety of soil types, vegetation, and wildlife. Tables 3-9 and 3-10, in the *Timber and Other Vegetation* section of this chapter display the distribution and relative abundance of the four plant series and five nonforest plant communities that occur in the Project Area. The types and distribution of vegetation are greatly influenced by the 19 different landforms and 113 soil mapping units in the Project Area (West and Huecker 1992a). These landforms and soil mapping units represent a broad array of soil types, landscape positions, and soil development processes.

Most of the 300 species of birds, fish, and mammals that occur on the Tongass National Forest probably reside in or use the Southeast Chichagof Project Area at some time during their life cycle. The ten MIS chosen for the Project Area represent the diverse habitat needs of landscape, community, and structural-scale species and provide a means to monitor biological diversity. Tables 3-27 through 3-33 show the habitat capability by VCU for the MIS in the Project Area. Habitat capability for all MIS is sufficient to support viable populations. Table 3-23 displays the range of wildlife habitats that occurs and the relative abundance and distribution of each habitat by VCU. Habitats are well connected by stream corridors, beach fringe, and other unharvested areas for wildlife movement within the Project Area.

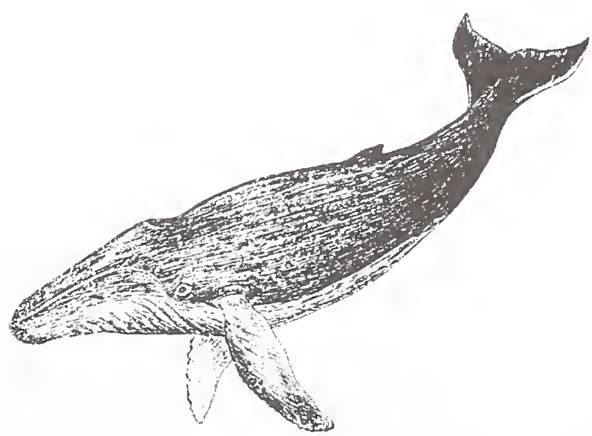
Threatened and Endangered Species

The humpback whale has been on the U.S. Endangered Species list since 1970 and occurs in most of the waters of Southeast Alaska; however, there is no designated critical habitat nor is there any area being considered for designation as critical habitat near the Project Area (Pennoyer 1990). On April 5, 1990, the Steller sea lion was designated threatened. This species may occur near the Project Area; however, no critical habitats are designated in or near the Project Area at this time (Pennoyer 1990).

The endangered American peregrine falcon, Aleutian Canada Goose, and Eskimo curlew, and the threatened Arctic peregrine falcon may occur in the Project Area as migrants; however, they are not likely to be affected by activities arising from this project (Gates 1992). The status of the marbled murrelet and northern goshawk is being considered and may be listed in the future. No other threatened or endangered species are known to occur in the Project Area.

Three Category 2 candidate animal species are likely to occur in the Project Area: The Queen Charlotte goshawk, marbled murrelet, and harlequin duck (Lindell 1992). The status of these species is currently under review by the U.S. Fish and Wildlife Service. There are several Category 2 plant species potentially occurring in the Project Area, including Aster yukonensis, Calamagrostis crassiglumis, Carex lenticularis var. dolia, and Montia bostockii (Lindell 1992).

Sensitive species are those plant and animal species identified by the Forest Service whose population viability is a concern. None of the eight listed sensitive species are known to occur or are suspected to occur in the Project Area. See Appendix F for documentation of consultation under Section 7 of the Endangered Species Act and for the Biological Assessment on endangered, threatened, sensitive, and candidate species.



Cultural

Historic photo

Cultural resources located in the Project Area are varied and numerous with sites ranging from prehistoric times through historic periods; there are sites dating back to 10,000 years ago. The oldest sites located to date are characterized by a microblade (small stone blades with sharp cutting edges) and microblade core (the prepared stone from which blades are removed) tool technology (Ackerman 1972; Davis 1989). This technology, identified as the Paleomarine Tradition (Davis et al. 1990), is thought to be associated with cultures which adapted to a marine resource economy. The technology was present from approximately 10,000 to 5,000 years before present (B.P.) and seems to have been replaced by a ground- and polished-slate tool industry (Davis 1990).

This shift in tool technology may have resulted from the introduction of a new cultural group into the region, or it may indicate adaptation to changing environmental conditions. Until more data are collected to add information to the existing database, it is difficult to make conclusive statements concerning the early prehistoric cultures which inhabited this region. "Presently known prehistoric sites in Southeast Alaska dating younger than 5,000 B.P. all seem to share elements of a Northwest Coast cultural pattern, but our data are as yet too fragmentary to demonstrate clearly anything like a developmental sequence that spans the last 5,000 years of prehistoric time" (Arndt et al. 1987). Whether this was antecedent to the Tlingit culture, and at what time the latter culture became established, are questions which remain to be answered (Arndt et al. 1987).

Historically, Southeast Alaska has been the home of the Tlingit, Alaskan Haida (Kaigani), the Tsetsaut and Eyak. Of the four, the Tlingit have been dominant, controlling at one time or another the entire Southeast from north of Yakutat Bay south to Dixon Entrance (Arndt et al. 1987). The Southeast Chichagof Project Area, historically, has belonged to and been used by the people of Angoon. According to Goldschmidt and Haas (1946), the Angoon people occupied the shore of Chatham Straits from Basket Bay southward to Gut Bay. At one time, Tenakee Inlet, Freshwater Bay, and False Bay were all part of the Angoon territory. Their territory also extended as far west as Poison Cove in Peril Strait. Hunters also ventured as far west as Kalinin Bay in Salisbury Sound to hunt for sea otter (Goldschmidt et al. 1946).

The Basket Bay area "belonged to the Kak'weidi (a branch of the Deisheetaan Clan) who were connected to the Angoon people, but had their tribal house at Basket Bay" long ago (Goldschmidt and Haas 1946). Peril Strait was claimed by the Teikweidi of Angoon; however, because of the close ties between the Angoon and the Sitka branches, it is difficult to draw any definite lines between the localities claimed and used by the two divisions (Goldschmidt and Haas 1946; de Laguna 1960).

The historic period in Alaska began with the second Kamchatka Expedition of Vitus Bering in 1742. The interactions between the Native populations and the Euro-Americans can be defined as a three-stage process (Arndt et al. 1987): 1) the incipient early contact stage, 2) the contact-traditional stage, and 3) the government-commercial stage.

Stage 1 is identified with the availability of European goods exclusively through previously established Native trade systems or through direct but initial or irregular contact with European agents. During this stage, European items were not yet considered "necessities" in the Native lifestyle.

Stage 2 is signified with the establishment of trading posts which were in proximity to a Native's traditional home area or which were easily accessible. During this stage, Natives mostly pursued their own activities apart from the presence of Europeans.

Stage 3 is the stage whereby the populations become the "fringe" group around white-dominated settlements. During this stage, Native groups were at various levels of change, depending on the geographical location and availability of desired goods from the Europeans.

In 1741, Aleksei Chirikov sent two longboats ashore near Lisianski Strait to explore the area. The boats never returned. Chirikov, having no other shore boats, simply made note of the loss in his journal and set sail for Russia, leaving behind his men and any impressions of the area or its people. It was another 30 years before subsequent explorations were made. At that time, Russian explorers were joined by Spanish, French, English, and American traders.

The establishment and colonization of the Russia-American Company in Yakutat and Sitka provided the impetus for European development and cultural influence in Southeast Alaska (Autrey 1990). Historic explorations in what is now the Southeast Chichagof Project Area appear to have been poorly documented since little information about early contact can be found in the available literature. It is not until the government-commercial stage of historic development that information, in the form of artifacts and written documentation, becomes more readily available.

Historic sites identified in the Project Area include cabins, trails, shelters, fishing industry remains, fox farms, and camps. The remains of many of these sites, both historic and prehistoric, provide the only record of former human occupation, work areas, and lifestyles. Within the Project Area, there may be important religious and/or cultural sites which are yet to be identified. The recovery of information from these sites and objects enables cultural resource specialists to reconstruct previous human behavior and adaptation in response to environmental or social change.

Cultural Resource Surveys

In accordance with the National Historic Preservation Act of 1966, as amended, the National Environmental Policy Act of 1969, and a series of implementing regulations and policy direction, the Chatham Area of the Tongass National Forest is undertaking a program to identify, evaluate, preserve, and protect cultural resources. Specific direction has been incorporated into the Regional Guide from the Alaska Area Guide which gives the following direction concerning cultural resources:

1. Manage cultural resources as a non-renewable national heritage:

    a. Ensure cultural resource specialists input to project planning at the earliest possible time.

    b. Evaluate cultural resources for inclusion in the National Register of Historic Places.

    c. Forest Service plans and programs affecting cultural resources need to contribute to the preservation and enhancement of cultural resources and assure access to sites or resources important to traditional Native religious practices, rites, or ceremonies.

    d. Avoid adverse effects where possible, or develop mitigation alternatives in consultation with the State Historic Preservation Officer and Advisory Council on Historic Preservation.

With this strong direction and background, a survey design has been prepared by the Chatham Area archaeologists and approved by SHPO for the Southeast Chichagof Project Area. This survey design provides a planned outline for conducting complete archaeological surveys in certain prescribed areas for the entire Project Area. A complete survey consists of a systematic walkover of an area with shovel tests dug at previously determined intervals. A variety of characteristics have been considered and weighed in designing where the surveys will be conducted, such as known previous land use patterns, isostasy (rebounding of the earth's crust) and eustasy (changes in sea level), and degree of slope, to name a few of the considerations.

To date, 11 surveys have been conducted in the entire Project Area (see Table 3-39). Most of these surveys have been conducted at the basic cursory level, that is, simply walking through areas which "look" like they may contain archaeological sites. Some of these surveys have been conducted on specific cutting units as outlined in previous survey designs. The bulk of these surveys were conducted by Forest Service personnel or contractors. A few were conducted by the Sealaska Corporation in response to the Alaska Native Claims Settlement Act (ANCSA) of 1971, which allows Native Corporations to select Native cemetery and historical sites in Southeast Alaska.

Cultural resources located on the Chatham Area represent an important part of our local, regional, and national cultural heritage. Currently, the inventory is incomplete and the number of known sites may represent only a small proportion of the total number of cultural resources that actually exist in the area. Cultural resources which remain on the Forest are a nonrenewable resource and may not be duplicated elsewhere. As surveys such as the one of the Southeast Chichagof Project Area become more intensive and complete, cultural resources will continue to be identified. Information gathered from these surveys will provide opportunities to learn more about resource distribution, improved methods of site discovery, sensitivity to damage, and data collection. Such an approach will provide continued and improved flexibility as methods, technology, and management priorities evolve with time.

Table 3-39
Previous Surveys Conducted in the Project Area

VCU	Total No. Sites/VCU	Location	By Whom	When
227		No Previous Surveys		
228	0	Long Bay	Ackerman	1974
229	0	Seal Bay	Ackerman	1974
230	0	Inbetween/ Unnamed Bay	Ackerman	1974
		Inbetween (LTF)	Fields & Davidson	1979a
231	0	Saltery Bay	Ackerman	1974
232	0	Crab Bay	Ackerman	1974
233	1	Crab Bay	Ackerman	1974
235	1	Kadashan Bay	Ackerman	1974
			Fields & Davidson	1979b
			Stanford	1980
			Lightfoot	1981
236	3	Corner Bay	Ackerman	1974
			Herem & Yancy*	1975
			Stanford	1980

Table 3-39 (continued)

Previous Surveys Conducted in the Project Area

VCU	Total No. Sites/VCU	Location	By Whom	When
237	0	Pt. Foo - Pt. Hav	Ackerman	1974
		Trap Bay	Fields & Davidson	1979c
			Swanson	1987
238	0	Chatham Strait	Lively	1991
239	1	Basket Bay	de Laguna	1960
			Nelson, Symes, Sanderson & Lockhart*	1975
			Bergey & Swanson	1987
			Swanson-Iwamoto	1988
			Lively	1991
240		No Previous Surveys		
241		No Previous Surveys		
242	3	Peninsular Pt.	Nelson, Symes & Edenshaw*	1975
		Point Hayes Morris Reef	Autrey	1984
		Point Hayes	Irish	1990
243	3	Sitkoh Creek	Lyon, Wagner & Lockhart*	1975
			Sackett	1979
			MacAfee	1982
		Sitkoh Bay	Swanson	1984
			Swanson	1986
			Lively & Davis	1989
			Street & Irish	1990
244		No Previous Surveys		
245	4	Pt. Craven	Nelson, Symes & Edenshaw*	1975
		Jingle Cove	Fields	1979
			Thibault	1980
		Todd Cannery	Autrey & Harris	1982
		Lindenberg Head	Swanson, Dolitsky & Stipp	1985
		Jingle Cove	Lively	1989
			Lively	1990
			Starr	1991
		Pt. Craven	Bunch	1991
246	2	Broad & Finger Creeks	Nelson, Symes & Edenshaw*	1975
			Lyon, Wagner & Lockhart*	1975
			Autrey	1978
			Fields & Davidson	1979d

SOURCE: Iwamoto 1992a.

* Surveys conducted by Sealaska Corporation

Economic and Social

"Lifestyles are more or less coherent patterns of behavior which are freely chosen by individuals or groups of persons. A lifestyle is more likely to change according to individual preference and circumstance than are basic norms or institutions of a culture. Lifestyle implies a person's central life interest which spills over into work, family, recreation, and religion" (Feldman & Thielbar 1972).

National forest resources are essential to the livelihood of many individuals in Southeast Alaska. The economics of most communities depend almost exclusively on the Tongass National Forest to provide natural resources for fishing, tourism, recreation, timber harvesting, mining, and subsistence. Because very little private land exists to provide these resources, people who earn their living in the National Forest are concerned about maintaining its abundant natural resources.

The Tongass is a popular area for recreation.

The value of logs for lumber and pulp production has led to the development of the wood products industry, an important component of the economic base of communities throughout Southeast Alaska. The watersheds of the Tongass provide spawning habitat for pink salmon, the dominant catch of the commercial fisheries fleet. The abundance of wild game and panoramic vistas draw tourists and recreationists from around the world. Aggressive marketing strategies by local communities target the ensuing demand for goods and services. For some individuals, cash income is less essential or available, and forest resources are harvested and used directly for subsistence purposes. Although the options are many in Southeast Alaska, the choice of livelihood is purely a matter of individual preference and cultural beliefs. As a result, the discussion to follow is limited in scope and addresses only the indicators of lifestyle that can reasonably be measured.

When goods and services are sold to markets outside the local area, "new" dollars are pumped into the community creating an economic base which is vital to community stability and growth. The economic base of Southeast Alaska is composed of commercial fishing and processing industries, the wood products industry, State and Federal government, and tourism-related trade. The operational expenditures of these industries and the personal expenditures of their employees generate demand for a number of other industries. As a result, growth (or decline) of industries in the economic base can be expected to be mirrored in the overall state of the economy. Thus, the significance of monitoring structural changes in the economic base becomes apparent. Because a disproportional share of government employment is located in Juneau, the discussion to follow necessarily focuses on private sector employment to more accurately represent the communities in the vicinity of the Project Area. Employment in the private sector of Southeast Alaska is dominated by the seafood industry (37 percent), the wood products industry (33 percent), and tourism-related industries (27 percent), broken down as follows (figures are for 1990).

Directly Affected Communities

Currently, only about 65,000 people live in the 33 towns, communities, and villages located within or near the boundaries of the Tongass National Forest (USDC 1991). With the exception of Sitka, the communities most directly linked to the resources in the Southeast Chichagof Project Area are small, isolated, and accessible only by air or water. Historical events and differing resource endowments have frequently led Alaskan communities along divergent paths of economic development. The discussion below provides some insight into the economic structure of the communities that would be directly affected by timber harvest in the Southeast Chichagof Project Area.

The wood products industry is an integral part of the economy of Southeast Alaska.

Sitka

Sitka is located approximately 48 nautical miles from the Project Area on the west coast of Baranof Island; it is the only community in the Alexander Archipelago that fronts the Pacific Ocean. With a population of 8,588, Sitka is the third largest community in Southeast Alaska. Whereas other communities in Southeast Alaska rely on the wood products industry, the seafood industry, government employment, or tourist trade for the bulk of their economic activity, Sitka incorporates a share of all these industries in its economy.

Sitka serves as a regional center of higher education, hosting one of the State's few private colleges and a branch campus of the University of Alaska Southeast, along with the only state-operated boarding school in Alaska. The health care industry is also prominent in Sitka's economy. The Southeast Alaska Regional Health Corporation (SEARHC), Sitka Community Hospital, and the Pioneer's Home together employ over 400 local residents. These two regionally oriented service industries, in conjunction with an aggressive tourism marketing strategy, have contributed to the major role the service and retail trade industries play in the economic base of the community.

There are no readily available statistics on employment in fish harvesting for Sitka residents, but the city offers the largest number of boat slips in Southeast Alaska, over half of which were occupied by fishing boats in 1989. This fact, along with the number of limited entry salmon permits held by area residents (393 in 1988), indicates that fish harvesting plays an important role in the economic well-being of many local residents. A number of fish processing facilities are also located in the community, adding value to the local catch.

The establishment of the APC pulp mill in the 1950s brought a promise of higher paying, stable employment to the community of Sitka. To a large extent, this promise has been fulfilled. Many of the company's 400 mill employees have been long-term residents of Sitka and the average wage of $44,700 brings a considerable amount of disposable income to the community. Timber harvested in the Southeast Chichagof Project Area would provide some of the raw materials needed for operation of this pulp mill.

Wrangell

Wrangell is located approximately 148 nautical miles from the Project Area on the northern tip of Wrangell Island. The population in 1990 was estimated at 2,479. While commercial fishing contributes significantly to Wrangell's economy, the harvest and processing of timber constitutes most of the economic base. The Wrangell sawmill, a subsidiary of APC, is the community's largest employer providing jobs for 230 people during single shift operations. Timber harvested in the Southeast Chichagof Project Area could supply some of the raw material needed for operation of this mill. Government is the third major employer in Wrangell's economy, followed by tourism, which is growing in economic influence.

Hoonah

Hoonah is located approximately 42 nautical miles from the Project Area on the northwestern tip of Chichagof Island. The 1990 population of Hoonah was estimated at 795 persons, approximately 67 percent of which are Native Tlingits. The traditional and major source of employment in Hoonah is commercial fishing and fish processing. During the summer fishing season, the economy reaches a level of full employment. Recently, logging activity on Native lands as well as Forest Service sale areas has served as an additional source of employment. Nearby Whitestone Logging employs approximately 200 people, including a number of Hoonah residents.

Tenakee Springs

Tenakee Springs is located approximately 4 nautical miles from the Project Area on the east side of Chichagof Island. Tenakee is predominantly a retirement community, although a number of commercial fishing permits are held by local residents, indicating that this may be an important source of income. Other employment sources include city operations and timber harvest activities in nearby areas. Tourism is becoming increasingly important to Tenakee and many visitors come to use the local hot springs. In addition, people from Juneau and Sitka have built cabins in the Tenakee area and use them frequently in the summer. When these visitors make purchases in the local economy, a wide variety of industries benefit.

Angoon

The community of Angoon is the only permanent settlement on Admiralty Island. It is approximately 16 nautical miles from the Project Area. Of a total population of 540 (USDC 1991), some 97 percent are Tlingit Natives. Commercial fishing and educational services are the primary source of income for Angoon residents. Employment outside these industries is limited to local government and village corporation positions, with some residents receiving transfer payments. Because of competition from larger fishing boats, a shortened fishing season, and the closure of some areas, fishing provides neither a strong economic base for the community nor adequate income for fishermen. This results in high unemployment rates throughout the year and underscores the importance of subsistence hunting, fishing, and gathering of intertidal resources to residents of Angoon.

Receipts and Payments

Table 3-40 shows the total receipts from the Tongass timber program and payment to the State of Alaska. By law, 25 percent of all receipts to the Federal treasury from management of the Tongass National Forest is returned to the State of Alaska. State regulations specify that this payment is paid to organized boroughs in proportion to the percent of the forest located in each borough for public roads (75 percent) and schools (25 percent). Until recently, the amount corresponding to the area in the unorganized boroughs went to the State's general fund to be similarly divided between roads and schools. Recent legislation has reallocated this portion of the funds to the Department of Community and Regional Affairs for use in roads and schools either within the forest boundary or within 20 miles of it.

Table 3-40

Forest Receipts and Payments to the State of Alaska in FYs 1980-1988

Fiscal	Tongass Receipts[1]	Payments to Alaska
1980	26,024,494	6,506,124
1981	15,007,944	3,751,986
1982	21,622,764	5,405,691
1983	5,365,915	1,341,479
1984	4,063,189	1,015,797
1985	209,231	2,308
1986	1,967,240	491,810
1987[2]	-2,033,575	—
1988	1,232,672	308,168
1989	20,183,133	5,045,783
1990	36,010,243	9,057,119
Total	129,653,250[3]	32,976,265

SOURCE: Morse 1991.

1 Capital investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management cost, and are scheduled to achieve management objectives described in the TLMP.

2 The Tongass National Forest receipts for fiscal year 1987 were negative as a result of Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass National Forest receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

3 Does not include receipts foregone as a result of the Federal Timber Contract Payment Modification Act. Estimated total value of affected contracts was approximately $54.5 million prior to the Act if all volume was harvested. Total value of the affected contracts as a result of the Act was approximately $1.2 million. The difference of $53.3 million represents receipts foregone; thus, the total Tongass receipts for the period fiscal years 1980 to 1988 would have been $126.8 million.

Subsistence

With the passage of the Alaska National Interest Lands Conservation Act (ANILCA), Congress recognized the importance of subsistence resource gathering to the rural communities of Alaska. ANILCA (16 USC 3113) defines subsistence as:

> The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.

ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on public lands." It also states as policy that subsistence uses of renewable resources shall be the priority consumptive uses of all such resources on the public lands of Alaska.

Effective July 1, 1990, the Federal government took over the management of subsistence use of fish and wildlife resources on Federal public lands. This management is regulated by the Federal Subsistence Board. The taking of fish and wildlife on public lands for subsistence uses is restricted to Alaska residents of rural areas or rural communities. Nonrural residents are not provided a preference for the taking of fish and wildlife on public lands. Juneau and Ketchikan have been determined to be nonrural by the Federal Subsistence Board.

Many Southeast Alaska communities use natural resources as a base or supplement to their livelihood. Nearly a third of rural households in Southeast Alaska get at least half their meat and fish by hunting and fishing (Holleman and Kruse 1991). Fish and game are widely preferred sources of food among Southeast Alaska households, regardless of the household incomes. Examples of major subsistence resources include deer, salmon, halibut, trout, harbor seal, crab, clams, waterfowl, and berries (Kruse and Muth 1990).

Subsistence activities represent a major focus of life for rural residents. These resource or subsistence gathering activities include hunting for deer, bear, marine mammals, and birds; digging clams, catching fish and shellfish (crabs, shrimp); harvesting marine invertebrates; trapping furbearers; collecting firewood; collecting herring eggs; and collecting berries and edible plants and roots. Subsistence goods may be eaten, traded, given away, or made into an item of use or decoration. For example, the skins from brown bear or fur from the marten or sea otter may be used for regalia costumes used in ceremony and dance.

Even for households which can afford to purchase all their their own food, the act of gathering subsistence resources is an important cultural aspect reflecting deeply held attitudes, values, and beliefs. Some traditional foods are not available through any means other than subsistence, and often, the occasions for gathering wild foods and edible plants are social events. Historical patterns of movement, such as the annual cycle of dispersal into small family groups at summer fishing camps and then to larger gatherings at protected winter villages, are also linked to the tradition of subsistence gathering.

Sharing of subsistence resources is important not only between households within communities, but also with extended families and friends in other areas. This includes sharing with those households unable to participate in the harvest of resources. Because some communities have access to resources not found in other communities, sharing of subsistence resources occurs between communities as well as within communities.

Native Alaskan picking crab apples

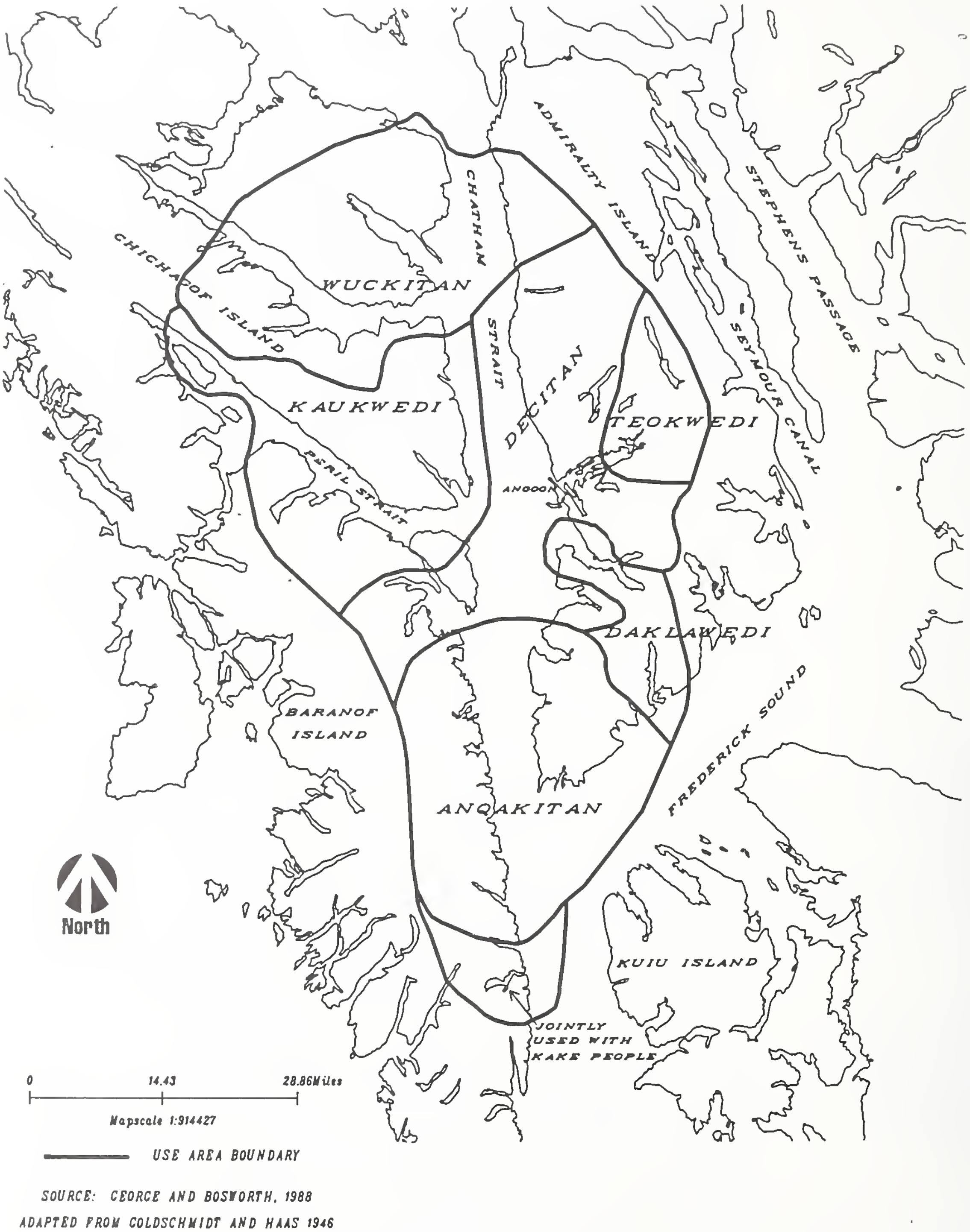
Average per capita income may or may not indicate the importance of subsistence to a community. While individuals of low income may have a greater dependence on subsistence gathering, individuals with a higher income may simply be in a position to have a more comfortable lifestyle because they combine their subsistence activities with their ability to purchase goods. Higher income does not deter an individual from gathering resources and sharing those with friends and family (Kruse and Muth 1990).

Historical Tlingit Clan Hunting Boundaries

Goldschmidt and Haas (1946) mapped and described areas of aboriginal use and ownership and historic and contemporary use areas. Comparing these maps with information from the 1987 TRUCS maps and ADF&G Subsistence Division maps appears to show that hunting and fishing use by Natives in Southeast Alaska is still tied to some extent to historical traditions of who may hunt and fish on which lands. Despite the introduction of technological innovations (such as large, modern boats) that would allow residents of Native communities to range much greater distances than in earlier periods, their use appears to be concentrated in locations generally conforming to traditional clan land ownership boundaries. The distribution of harvest locations for non-Native communities, on the other hand, is often apt to range over greater areas.

Based on the work of Goldschmidt and Haas (1946) and the ADF&G, historical clan hunting boundaries of the Angoon, Hoonah, Kake, and Sitka Tlingit are shown in Figures 3-5 through 3–8 (George and Bosworth 1988; Schroeder and Kookesh 1990; Firman and Bosworth 1990; Goldschmidt and Haas 1946). Portions of the Southeast Chichagof Project Area fall within the traditional use areas of the Wooshkeetaan (Wuckitan) and Kak'weidi (Kaukwedi) clans from Angoon, Deisheetaan (Decitan) from Sitkoh Bay, and Teikweidi (Teokwedi) from the Peril Straits area, and possibly within the traditional use areas of other clans which were localized in Tenakee Inlet. (See note on Tlinglit spelling at the bottom of the following figures and at the end of the Glossary.)

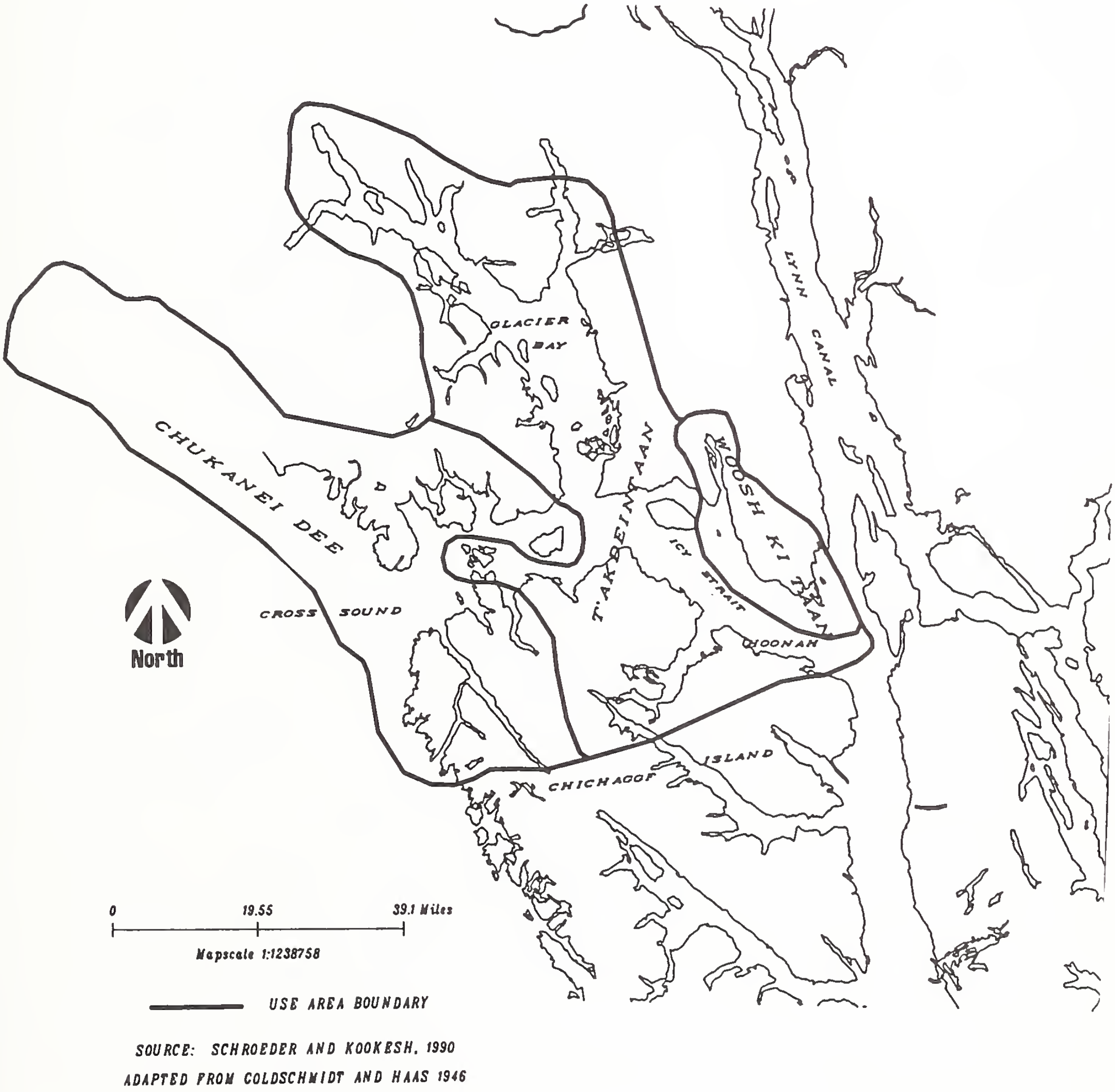
Figure 3-5
Historical Clan Ownership and Use Rights Boundaries of Angoon Tlingit



SOURCE: George and Bosworth 1988.

Note: The spelling of Tlinglit clan names in this figure are based on the original ADF&G technical paper and not on the current standard alphabet. See the discussion of Tlingit spelling and the conversion table at the end of the Glossary.

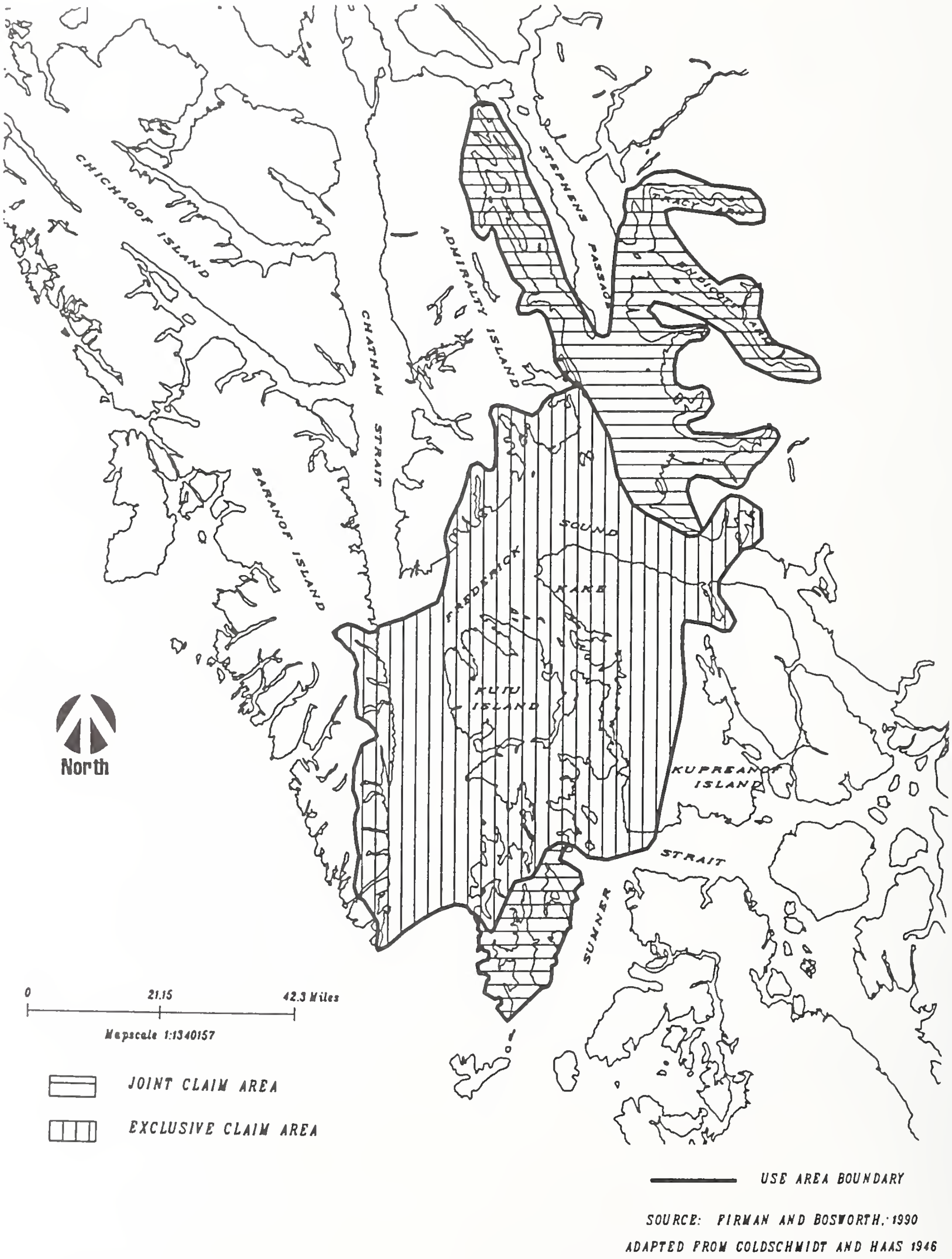
Figure 3-6
Historical Clan Ownership and Use Rights Boundaries of Hoonah Tlingit



SOURCE: Schroeder and Kookesh 1990.

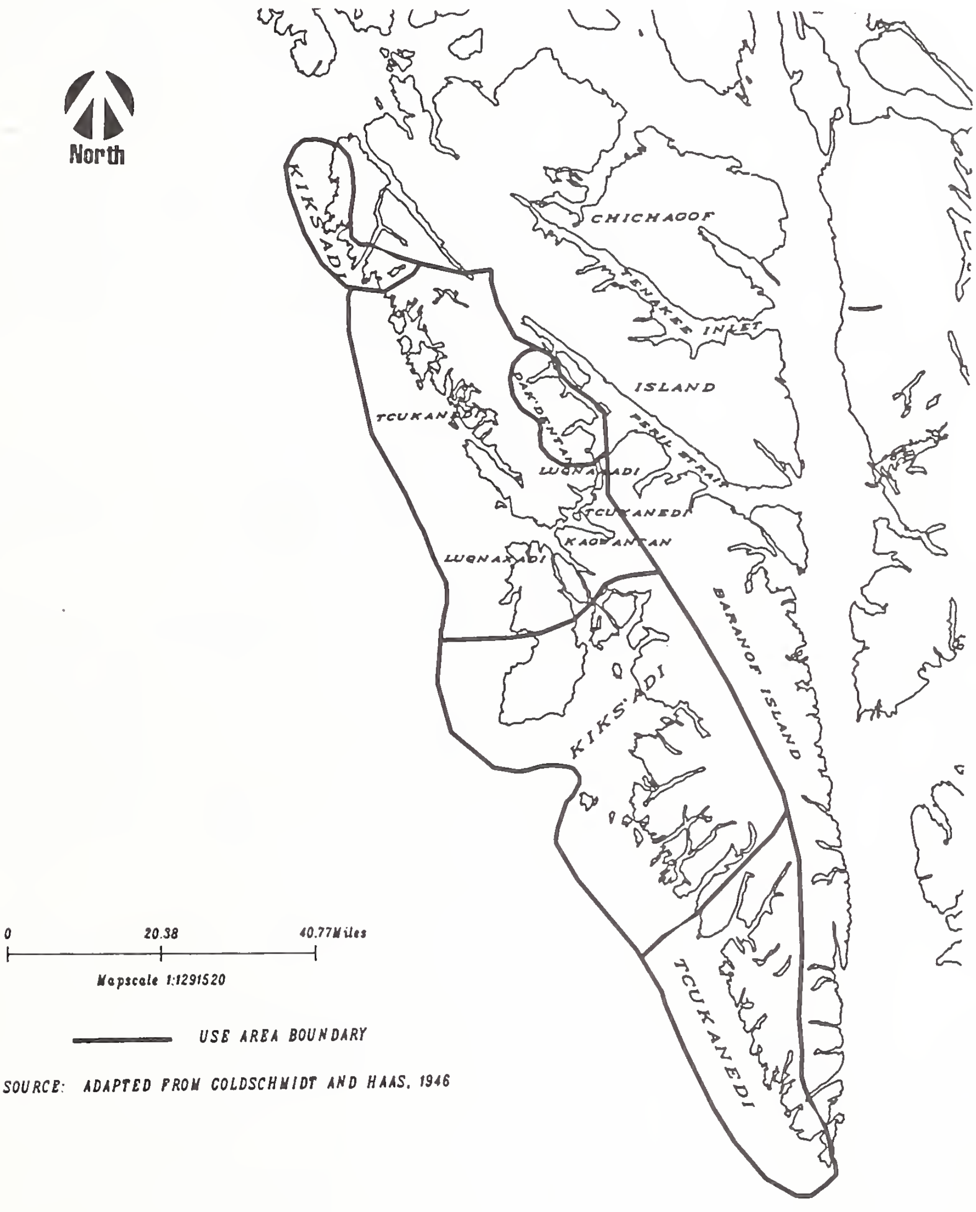
Note: The spelling of Tlinglit clan names in this figure are based on the original ADF&G technical paper and not on the current standard alphabet. See the discussion of Tlingit spelling and the conversion table at the end of the Glossary.

Figure 3-7
Historical Clan Ownership and Use Rights Boundaries of Kake Tlingit



SOURCE: Firman and Bosworth 1990.

Figure 3-8
Historical Clan Ownership and Use Rights Boundaries of Sitka



SOURCE: Goldschmidt and Haas 1946.

Note: The spelling of Tlinglit clan names in this figure are based on the original ADF&G technical paper and not on the current standard alphabet. See the discussion of Tlingit spelling and the conversion table at the end of the Glossary.

Subsistence Uses

Communities with Subsistence Uses

Subsistence is a complex issue covering many aspects of lifestyles which are embodied in the people who reside in Alaska. In striving to be sensitive to the subsistence needs of the users of the Southeast Chichagof Project Area, the Forest Service, with the help of the ADF&G Subsistence Division, and the Institute of Social and Economic Research (ISER), determined which communities should be included in the subsistence analysis. To make this determination, data collected in the TRUCS (Holleman and Kruse 1991) and ADF&G deer harvest survey statistics were used to identify communities which use the Project Area for subsistence. Selected communities had at least one household reporting ever hunting in at least 10 percent of one or more Project Area WAAs or reported harvesting deer in 1989 (Supplement to TLMP Revision DEIS, Appendix K).

The following communities fell within the criteria boundaries and were selected for analysis: Angoon, Haines, Hoonah, Juneau, Ketchikan, Meyers Chuck, Petersburg, Sitka, Skagway, Tenakee Springs, and Wrangell. Of these communities, all are designated rural except Ketchikan and Juneau. Kake is a rural community which did not fall within the criteria boundaries. However, Kake was included in the analysis because of its relative proximity to the Southeast Chichagof Project Area and because of Kake's interest in the Kelp Bay EIS.

Important Subsistence Use Areas

The beach fringe throughout the Project Area has been identified as sensitive areas used for subsistence resource gathering. Coast or beach fringe is defined in the TLMP as the area of land within a 500-foot slope distance inland from the shoreline. On the TRUCS maps, the important use areas may extend from the beach to 6 miles inland.

Haines, Hoonah, Sitka, and Tenakee Springs identified important deer hunting areas extending from Long Bay in Tenakee Inlet on down to Sitkoh Bay in Chatham Strait. Long Bay, Seal Bay, Saltery Bay, Crab Bay, Kadashan Bay, and Corner Bay have been identified as important deer hunting and shellfish gathering areas. Estuaries in these bays provide important habitat for waterfowl; the tidal flats provide important shellfish habitat; the bays have salmon runs which contribute to the abundance of wildlife that utilize the estuaries. Basket Bay and Sitkoh Bay were identified as important for both deer hunting and subsistence harvest of sockeye salmon.

Geographic Extent of Regional Subsistence Use

Figure E-46 in Appendix E provides a regional perspective on the subsistence deer harvest taken by rural communities in Southeast Alaska. At this scale, federal subsistence and sport harvests can be compared in each Wildlife Analysis Area (WAA). For each WAA, the subsistence harvest is expressed as a percentage of the total deer harvest and is shaded accordingly. In general, on Baranof and Chichagof islands, the subsistence harvest is high compared to sport hunting; in many WAAs the subsistence harvest constitutes more than 90 percent of the total deer harvest. Within the Project Area, subsistence comprises 86 percent of the total deer harvest in WAA 3309, 70 percent in WAA 3308, and 62 percent in WAA 3630. In WAAs 3627, 3628, and 3629, where hunting pressure from Juneau and other nonrural communities is greater, the proportion of the deer harvest taken by subsistence hunters is between 25 and 37 percent.

Figures 3-9 through 3-12 show the geographic extent of subsistence use of the Project Area for deer, marine mammals, marine invertebrates, and salmon for all rural communities combined. The data presented in these figures are based on interviews with probability samples of households in 30 Southeast communities conducted in 1988 (Kruse & Frazier 1988).

Community-specific Subsistence Use

The following community-specific descriptions of subsistence use refer to a common set of tables and figures. Table 3-41 indicates the demographic data on communities identified as using the Project Area (1990 population and the 1988 per capita income by community as a context for the description of subsistence use). Figure 3-13 shows the pounds of edible subsistence harvest per capita by community. Table 3-42 indicates the per capita pounds of subsistence harvest by type of harvest for communities using the Project Area. Figure 3-14 highlights deer as a percentage of the total mean number of deer harvested by WAA for the period 1987 through 1990. Table 3-43 displays the mean number of deer harvested by each community in each Project Area WAA. Table 3-44 displays the community use of the Project Area for deer hunting from 1987 through 1990 on a percentage basis of a community's total deer harvest. The first column of data in Table 3-45 shows the average percent of deer harvest from the WAA associated with the Project Area that is taken by each community using the area. The second column of data in Table 3-45 shows the average percent of each community's total harvest that is taken from the Project Area.

The community-specific descriptions are primarily based on six sets of material: community Technical Reports produced by the Subsistence Division of the ADF&G (cited by community); ADF&G's Southeast Alaska Community Resource Use Profiles (1989); reports summarizing the results of the TRUCS including ADF&G (1989); Kruse and Frazier (1988); Kruse et al. (1988); Kruse and Muth (1990); Holleman and Kruse (1991); deer harvest survey summary statistics data collected and compiled by the ADF&G for 1987-1990 (Appendix E); and 1990 census data compiled by the Alaska Department of Labor (USDC 1991). These references are not cited repetitively.

The TRUCS of 1988 was directed by the University of Alaska's Institute of Social and Economic Research and was jointly carried out by the Institute, the Forest Service, and the Division of Subsistence of the ADF&G. As stated by Kruse and Frazier in the TRUCS (1988) all figures used in reporting subsistence are based on a sample of households; therefore, it is entirely possible that actual amounts harvested were either higher or lower than reported by sample households.

Figure 3-9
Southeast Chichagof Regional Subsistence Deer Harvest

Mapscale 1:250000

One - 25 households ever harvest deer

More than 25 households ever harvest deer

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

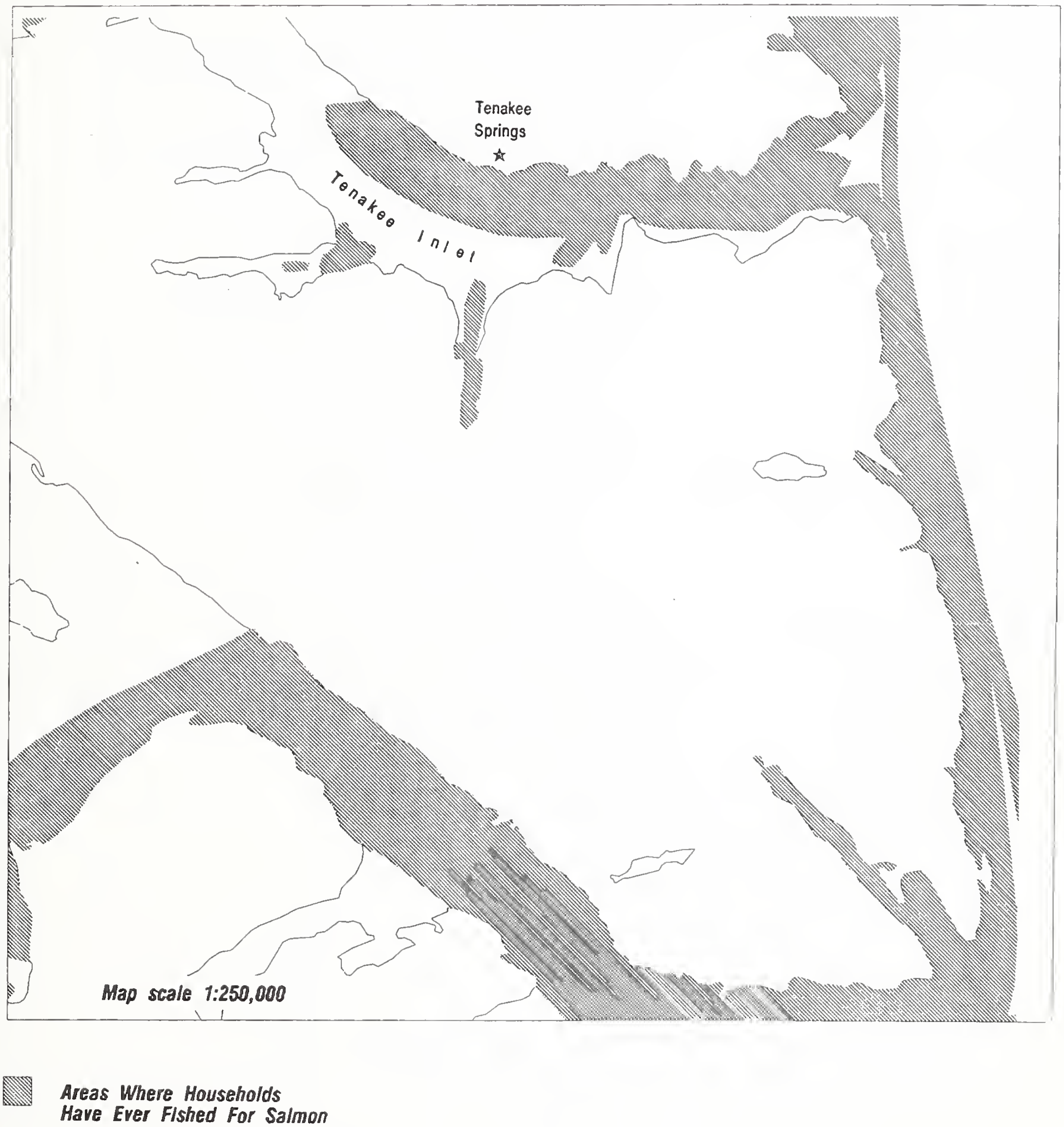
Figure 3-10
Southeast Chichagof Regional Subsistence Marine Mammal Harvest

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-11
Southeast Chichagof Regional Subsistence Marine Invertebrate Harvest

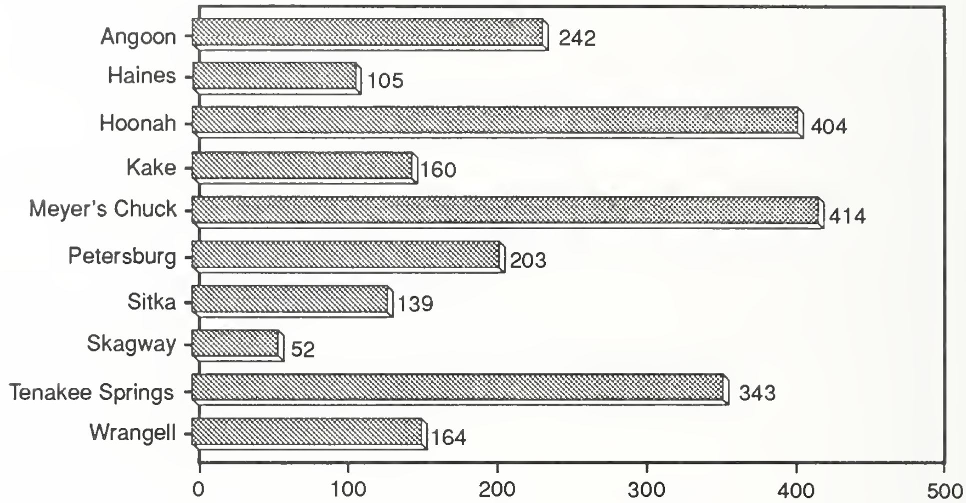
SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-12
Southeast Chichagof Regional Subsistence Salmon Harvest



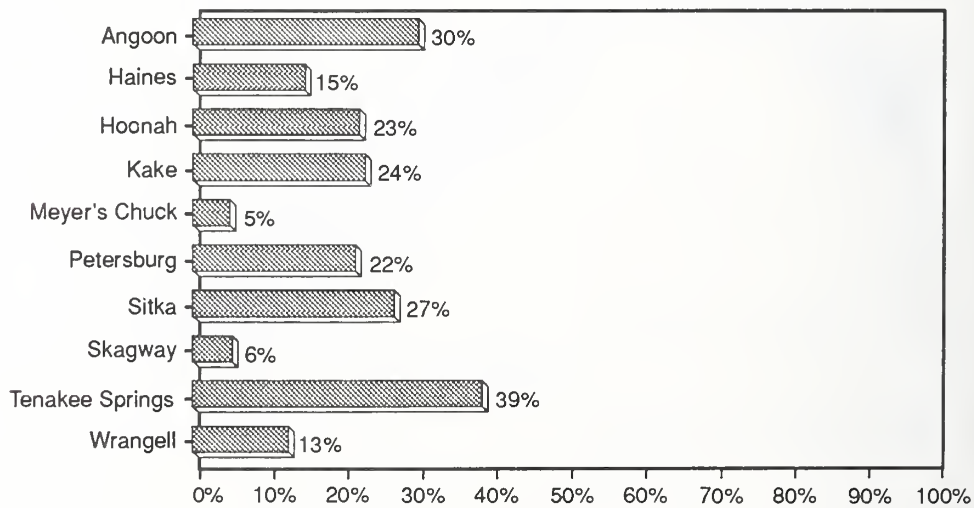
SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-13
Pounds of Edible Subsistence Harvest Per Capita (by Community)



SOURCE: Kruse and Muth 1990.
Note: Kake figure is likely to be an underestimate.

Figure 3-14
Deer as Percentage of Total Mean Edible Pounds of Subsistence Harvest (by Community)



SOURCE: Kruse and Frazier 1988.

Table 3-41
Demographic Data on Communities Identified as Using the Project Area

	1990 Population	Percent of Population that is Native	1987 Per Capita Income
Angoon	540	97	$5,364
Haines	2,117	13	$12,467
Hoonah	795	67	$9,353
Juneau*	26,751	13	$23,388
Kake	700	73	$9,057
Ketchikan*	13,828	14	$21,693
Meyers Chuck	37	11	$4,432
Petersburg	3,207	10	$12,602
Sitka	8,588	21	$14,572
Skagway	692	5	$12,295
Tenakee Springs	94	10	$9,080
Wrangell	2,479	20	$11,989

SOURCE: Hartmann 1992a.

* Income from ADF&G, 1989, Southeast Alaska Community Resource Use Profiles, Report to the Board of Fisheries.

Note: Income information derived from Kruse and Frazier 1988 Tongass Resource Use Cooperative Survey (TRUCS) Community Reports. Population information is derived from U.S. Department of Commerce, Bureau of the Census. Compiled by Alaska Department of Labor, Research and Analysis, June 1991.

Table 3-42
Per Capita Subsistence Harvest Data for Rural Communities in 1987

	Deer Harvest (Lbs.)	Other Mammal (Lbs.)	Salmon Harvest (Lbs.)	Finfish/ Shellfish (Lbs.)	Other Harvest (Lbs.)	Total Harvest (Lbs.)	Mean % of Meat & Fish
Angoon	74	34	70	56	7	242	46
Haines	16	12	28	44	5	105	21
Hoonah	94	60	133	104	12	404	50
Kake	39	25	35	49	12	160	22
Meyers Chuck	21	37	105	227	24	414	45
Petersburg	45	19	46	80	3	203	31
Sitka	38	2	38	56	5	139	24
Skagway	3	1	18	28	2	52	9
Tenakee Springs	135	8	49	140	11	343	42
Wrangell	21	24	30	84	5	164	23

SOURCE: Hartmann 1992a.

Note: Information derived from ADF&G Southeast Alaska Rural Community Resource Use Profiles, February 1989 and Kruse and Muth, 1990. Data are not available for Juneau and Ketchikan.

Table 3-43
Mean Deer Harvest For 1987 through 1990

Community	WAA 3308	WAA 3309	WAA 3627	WAA 3628	WAA 3629	WAA 3630	Total
Angoon	25	0	3	0	0	0	28
Haines	0	0	4	9	35	25	73
Juneau	54	39	56	24	138	18	320
Ketchikan	12	0	4	0	3	2	26
Other Non-subsistence	0	1	2	0	8	0	11
Other Subsistence	5	0	7	1	2	1	16
Petersburg	40	19	0	0	0	0	59
Sitka	87	180	2	0	31	0	300
Skagway	0	0	0	0	5	0	5
Tenakee Springs	0	0	6	5	16	7	34
Wrangell	1	0	0	0	0	0	1
Total Subsistence	158	199	22	15	89	33	516
Total Non-subsistence	66	31	62	24	149	20	352
Total	224	230	84	39	238	53	868

SOURCE: Hartmann 1992a.

Note: Information derived from ADF&G Deer Hunter Survey Summary Statistics.
Total number of deer harvested expanded from deer hunter survey.

Table 3-44
Deer Hunting From 1987 to 1990 as a Percent of a Community's Total Deer Harvest

Community	1987	1988	1989	1990	Mean
Angoon	8	7	20	0	9
Haines	26	23	11	6	18
Juneau	8	9	7	6	8
Ketchikan	<1	0	2	2	1
Petersburg	8	0	7	3	4
Sitka	7	6	5	8	7
Skagway	0	0	39	5	15
Tenakee Springs	33	35	24	38	33
Wrangell	0	0	0	2	<1

SOURCE: Hartmann 1992a.

Note: Information derived from ADF&G Deer Hunter Survey Summary Statistics from 1987-1990.

Table 3-45
Importance of Deer Harvest to Communities in the Project Area for Years 1987 through 1990

Community	Average Percent of Harvest for Communities from WAAs 3308, 3309, 3627, 3628, 3629, and 3630	Relative Importance Average Percent of Community Harvest from WAAs 3308, 3309, 3627, 3628, 3629 and 3630
Rural Communities		
Angoon	3	9
Haines	8	18
Hoonah	0	0
Kake	0	0
Meyers Chuck	0	0
Petersburg	7	4
Sitka	35	7
Skagway	< 1	15
Tenakee Springs	4	33
Wrangell	<1	<1
Other Subsistence Communities	2	NA
Nonrural Communities		
Juneau	37	8
Ketchikan	2	1
Other Non-subsistence	1	NA

SOURCE: Hartmann 1992a.

Note: Derived from data from ADF&G Hunter Summary Statistics 1987-1990.

Angoon

Angoon is located on the west coast of Admiralty Island at the mouth of Kootznahoo Inlet. Angoon is approximately 16 miles east of the Project Area across Chatham Strait. The 1990 population was reported as 540. Ninety-seven percent of the population is Native. Per capita income for residents of Angoon in 1987 was reported as $5,364.

Angoon began as a winter village for the Tlingit Indians and remains a traditional Tlingit Indian village. The major sectors of Angoon's economy are educational services, fishing, construction, and retail trade. Employment in all sectors of Angoon's economy is highly seasonal with corresponding high unemployment. Subsistence hunting and fishing are a vital source of food in Angoon and an important part of the lifestyle and culture.

Angoon residents harvest deer, salmon, other finfish, waterfowl, and shellfish, as well as other resources. The annual harvest of subsistence resources was approximately 242 lbs. per capita in 1987. This amounted to 74 lbs. of deer, 34 lbs. of other mammals, 70 lbs. of salmon, 57 lbs. of finfish and shellfish, and 7 lbs. of other resources. The average Angoon household derived 46 percent of its meat and fish from subsistence harvests. Deer accounted for 30 percent of the subsistence harvest.

A study of fish and wildlife use by Angoon residents (George and Bosworth 1988) from 1957 to 1985 shows that they primarily use areas on Admiralty Island. The area around Kootznahoo Inlet was used by an average of 70 to 100 percent of households. The area north of Angoon between Poison Water and Fishery Creek was used by an average of 46 percent of households.

Specific areas of importance for subsistence gathering within the Project Area include Sitkoh, Basket and Florence Bays, Lindenberg, and White Rock. Sitkoh Bay is used to harvest deer, salmon, and invertebrates. Lindenberg and Florence Bay are used to harvest invertebrates and for deer hunting. White Rock is used to harvest marine mammals, invertebrates, salmon, and deer (George and Bosworth 1988).

The near-shore area from False Island in Peril Strait to Kadashan Bay in Tenakee Inlet is also used for deer hunting by Angoon residents. The beach fringe in WAA 3308 (False Island to Kook Lake) was identified by the community of Angoon as an important area for deer hunting and the taking of seals, which were usually taken in conjunction with each other. Waterfowl hunting for subsistence use overlapped with the taking of clams and crabs in the beach fringe and estuaries identified in TRUCS by the residents of Angoon.

A study of deer hunting by the community of Angoon (George and Kookesh 1983) indicates that Admiralty Island was the preferred place to hunt because of deer abundance, less competition from other hunters, proximity, knowledge of the area, and beaches suitable for boat landing. Peril Strait was reportedly not hunted by some hunters because of the presence of nonlocal hunters and logging activities.

Figure 3-15 displays TRUCS data showing where more than 10 percent of Angoon households harvest deer, where 1 to 10 percent of Angoon households harvest deer, and which areas are the most reliable and most often used for deer hunting.

ADF&G hunter survey data indicate that Angoon residents harvested a mean of 9 percent of their total deer harvest from the Project Area during 1987 to 1990. Annual harvest ranged from 0 to 20 percent during that period of time. The harvest reported to ADF&G on the deer hunter surveys for Angoon is known to be significantly less than the actual harvest (Hartmann 1991).

Most of Angoon's harvest took place in WAA 3308. WAA 3627 is also hunted. On the average, Project Area WAAs supplied 9 percent of Angoon's deer from 1987 through 1990. This accounted for 3 percent of the harvest from Project Area WAAs.

Haines

Haines is located on the north end of Lynn Canal on the Chilkat Peninsula and is approximately 100 miles from the Project Area. The 1990 borough population was reported as 2,117. Thirteen percent of the population is Native. Per capita income of Haines residents in 1987 was reported as $12,467.

The community of Haines originated as a mission site that became a trade center and supply point for miners. Haines is now the population center for the Chilkoot Tlingits. Haines' principal economic sectors are retail trade, government, forestry, commercial fishing, tourism, and transportation. Much of the employment is highly seasonal in nature.

The community of Haines harvested a total of 105 pounds of subsistence resources per capita in 1987. Of that per capita total, salmon comprised 28 pounds; shellfish and finfish, 44 lbs.; deer, 16 lbs.; other mammals, 12 lbs.; and other resources, 5 lbs. The average Haines household derived 21 percent of its meat and fish from subsistence harvest. Deer constituted 15 percent of the subsistence harvest.

Figure 3-15
Angoon Subsistence Deer Hunting Areas

Mapscale 1:250000

- More than 10% households harvest deer
- 1 - 10% households harvest deer
- Most reliable, most often used areas
- Previously cut areas
- Approved cut units

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

The area from Long Bay on down to Trap Bay in Tenakee Inlet was identified by Haines residents as important deer use area. The beach fringe from Basket Bay in Chatham Strait over to Finger Creek in Peril Strait was also identified as important deer use area.

Figure 3-16 displays TRUCS data showing where more than 10 percent of Haines households harvest deer, where 1 to 10 percent of Haines households harvest deer, and which areas are the most reliable and most often used for deer hunting.

In 1987, Haines residents harvested 26 percent of their deer harvest from WAAs 3628, 3629, and 3630. In 1988, 23 percent of Haines' deer kill was taken from WAAs 3627, 3628, 3629, and 3630. In 1989, 11 percent of the deer were harvested from WAAs 3629 and 3630. In 1990, 6 percent of Haines' deer harvest was from WAA 3630.

Haines' deer harvest from the Project Area comes mostly from WAAs 3629 and 3630. WAAs 3628 and 3627 are used to a lesser extent. On the average, Project Area WAAs supplied 18 percent of Haines' deer from 1987 through 1990. This accounted for 8 percent of the harvest from Project Area WAAs.

Hoonah

Hoonah is located at the entrance of Port Fredrick in the northeastern part of Chichagof Island in Southeast Alaska and is approximately 42 miles from the Project Area. The 1990 population was reported as 795. Sixty-seven percent of the population is Native. Per capita income of Hoonah residents in 1987 was reported as $9,353.

Hoonah is predominantly a Native community and the principal village for the Huna Tlingit Clans since the late 1800s. Their traditional territories include Glacier Bay, Icy Strait, and Cross Sound. Commercial fishing and canning has been a part of Hoonah's economy since the 1880s. A cold storage plant is still in operation in Hoonah. Large scale industrial logging on Tongass National Forest and Native Corporation lands began after 1980 (Schroeder & Kookesh 1990). Logging roads expanded the land accessible to subsistence gathering activities for both Hoonah residents and nonresidents. Employment in Hoonah is highly seasonal.

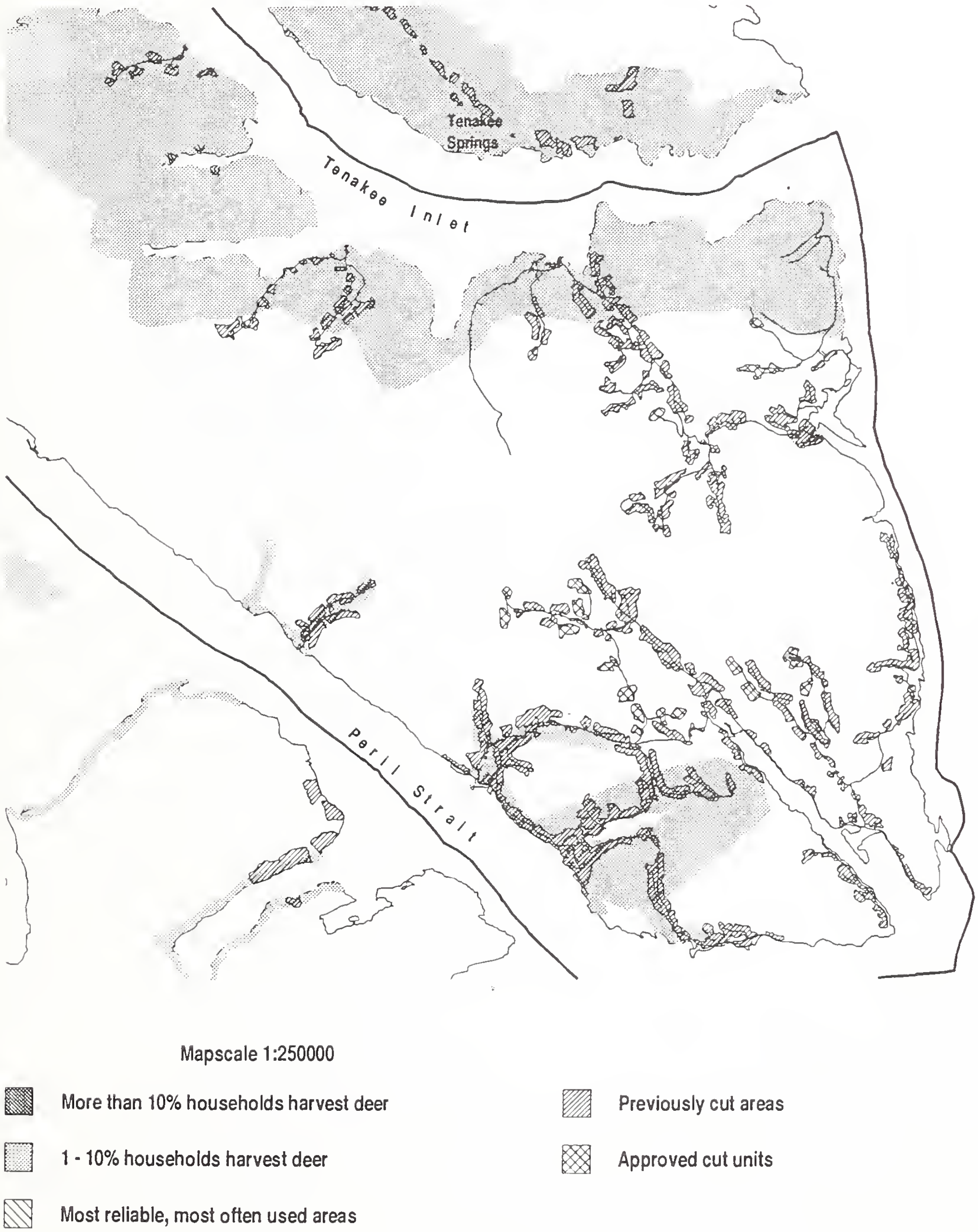
In 1987, Hoonah residents harvested an average of 404 pounds of subsistence resources per capita. Deer comprised 94 lbs.; other mammals, 60 lbs.; salmon, 133 lbs.; finfish and shellfish, 104 lbs.; and other resources 12 lbs. The average Hoonah household derived 50 percent of its meat and fish from subsistence activities in 1987. Deer constituted 23 percent of the subsistence harvest.

Principal deer use areas identified by Hoonah residents extended from Seal Bay (in Tenakee Inlet) to Trap Bay. The beach fringe in Basket Bay extending over to Finger Creek in Peril Strait was also identified as important deer use area.

Figure 3-17 displays TRUCS data showing where more than 10 percent of Hoonah households harvest deer, where 1 to 10 percent of Hoonah households harvest deer, and which areas are the most reliable and most often used for deer hunting.

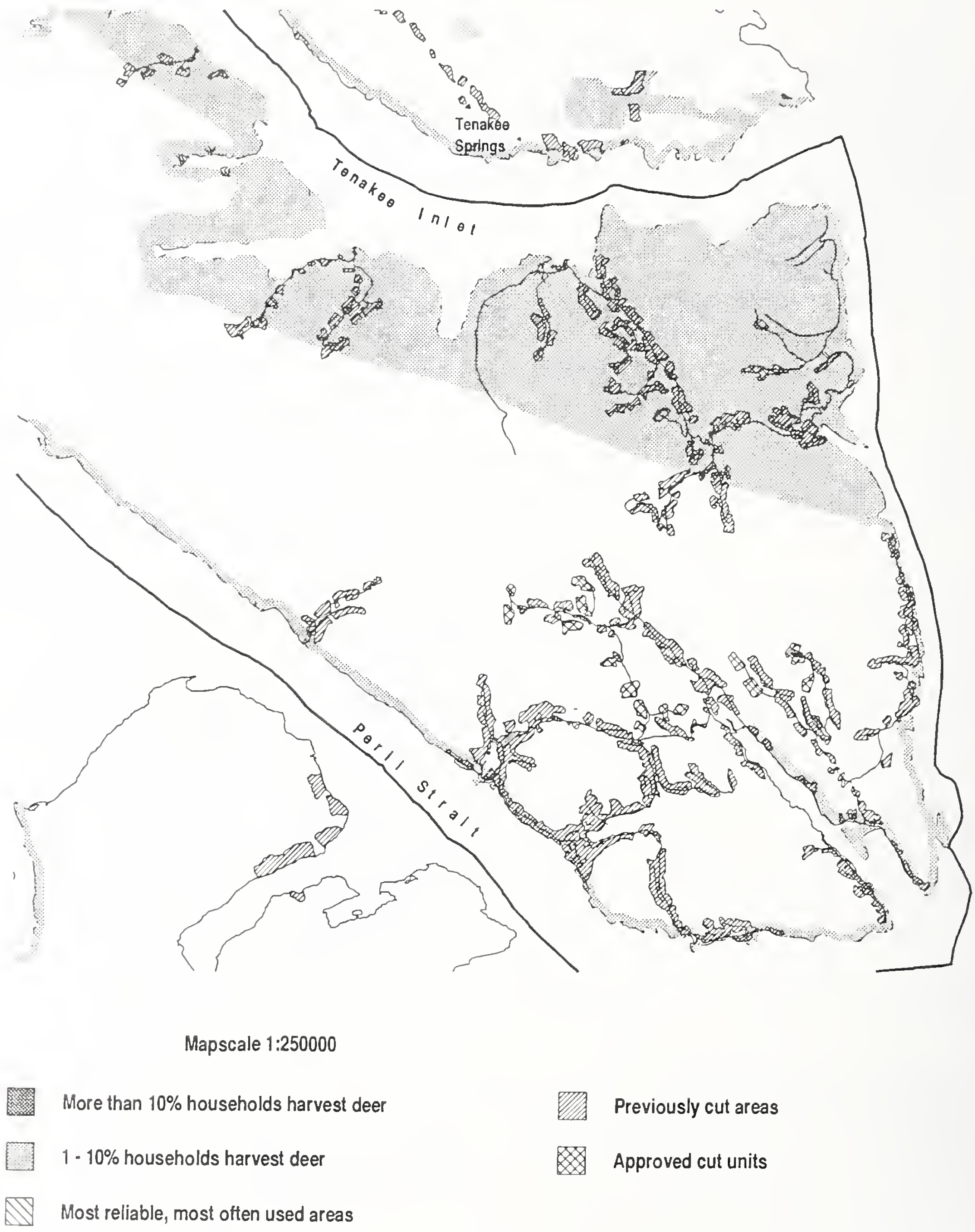
Hoonah residents did not report any deer harvest from Project Area WAAs for the years 1987 through 1990.

Figure 3-16
Haines Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-17
Hoonah Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Juneau

Juneau is located in northern Southeast Alaska on Gastineau Channel opposite Douglas Island. The 1990 borough population was reported as 26,751. Thirteen percent of the Juneau population is Native. Per capita income of Juneau residents in 1987 was reported as $23,388.

Juneau historically started as a mining community and has been the capital of Alaska since 1906. Government makes up at least half the economy of Southeast Alaska's largest city with tourism, retail, construction, and mining also comprising important parts of the economy. Juneau is considered a nonrural community by the Federal Subsistence Board. As a nonrural community, Juneau residents are not provided a preference for subsistence uses on public lands. Subsistence use data have not been collected for Juneau.

Juneau is in relatively close proximity to the Project Area by means of pleasure craft and by the Alaska Marine Highway system. ATVs are easily moved and can be transported by either the ferry or personal boat and utilized for hunting on roads previously used for timber harvest. Tenakee Springs and Angoon are both communities which have scheduled ferry stops and are nearer to the Project Area.

Juneau residents harvested deer from all Project Area WAAs. WAA 3629 had the highest harvest reported by Juneau residents; WAAs 3627 and 3308 have the second highest harvest; and WAAs 3309, 3628, and 3630 had the least reported harvest of the Project Area WAAs used by Juneau residents.

On the average, Project Area WAAs supplied 8 percent of Juneau's deer from 1987 through 1990. The range was 6 to 9 percent which demonstrates a stable yearly demand. The mean deer harvest by Juneau residents accounted for 37 percent of the harvest from Project Area WAAs from 1987 through 1990.

Kake

Kake is located on the northwest coast of Kupreanof Island about 60 miles by water from the Project Area. The 1990 population was reported as 700. Seventy-three percent of the population is Native. Per capita income of Kake residents in 1987 was reported as $9,057.

Tlingit Indians built villages and fishing camps in the Kake area in the early 1700s. During the 1800s, these villages were consolidated at the present site of Kake. Since then, the community has developed an economy based largely on the commercial fishing industry. A school and a store were built in 1891, a cannery in 1912. A cold storage built in 1980 is still in operation. Logging began in the 1940s and continues to provide some employment opportunities for Kake residents. Most of the logging in recent years has taken place on lands owned by the Kake Native Corporation. Kake's major economic sectors are fishing and fish processing, transportation, communications, and education services. Employment is highly seasonal. Much of Kake's population depends on subsistence hunting and fishing.

In 1987, the community harvested a total of 160 pounds per capita of subsistence resources. Of those 160 pounds of resources, salmon comprised 35 pounds per capita; shellfish and finfish, 49 lbs.; deer, 39 lbs.; other mammals, 25 lbs.; and other resources 12 lbs. The average Kake household derived 22 percent of its meat and fish from subsistence activities in 1987. Deer constituted 24 percent of the subsistence harvest.

A study of harvest and use of fish and wildlife by Kake residents indicates a high degree of conformity between contemporary use areas and traditional deer hunting territories of the Kake Tlingit (Firman & Bosworth 1990). Kake hunters travel an average of 28 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads or clearcuts of any age and more likely to hunt in areas that include muskeg, old-growth forest, open beach, grassy meadow, or areas above tree line (Kruse and Muth 1990).

Figure 3-18 displays TRUCS data showing where more than 10 percent of Kake households harvest deer, where 1 to 10 percent of Kake households harvest deer, and which areas are the most reliable and most often used for deer hunting.

The majority of Kake's deer harvest comes from WAAs 3939 and 3940, neither of which are Project Area WAAs. Kake residents did not report any deer harvest from Project Area WAAs for the years 1987 through 1990.

Ketchikan

Ketchikan is located in southern Southeast Alaska, on the southwest side of Revillagigedo Island on Tongass Narrows opposite Gravina Island. Ketchikan is approximately 260 miles by water from the Project Area. Ketchikan's 1990 borough population was reported as 13,828. Per capita income of Ketchikan residents in 1987 was reported as $21,693.

Ketchikan is considered a nonrural community by the Federal Subsistence Board. As a nonrural community, Ketchikan residents are not provided a preference for subsistence uses on public lands. Subsistence use data have not been collected for Ketchikan.

Ketchikan's deer harvest from the Project Area comes mostly from WAA 3308. WAAs 3627, 3629, and 3630 are used to a lesser extent. On the average, Project Area WAAs supplied 1 percent of Ketchikan's deer from 1987 through 1990. This accounts for 2 percent of the harvest from Project Area WAAs.

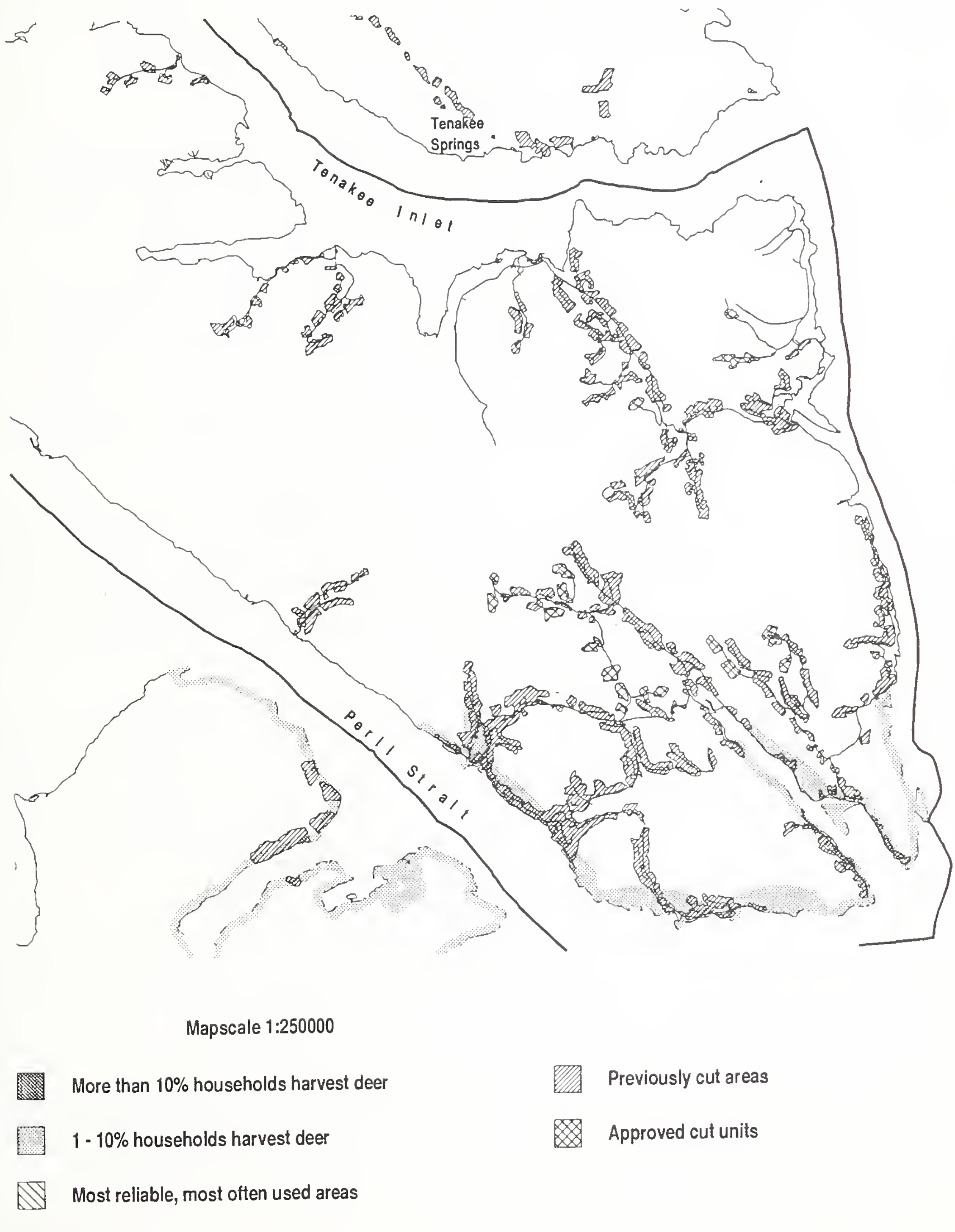
Meyers Chuck

Meyers Chuck is located 40 miles northwest of Ketchikan on Clarence Strait, on the tip of Cleveland Peninsula, and is approximately 230 miles by water from the Project Area. The 1990 population was reported as 37. Eleven percent of the population is Native. Per capita income of Meyers Chuck residents in 1987 was reported as $4,432.

Beginning as a protected anchorage for fishing vessels, Meyers Chuck developed into a permanent community with the building of a cannery at the turn of the century. Postal service began in 1922. Fishing and fish processing and support services sustained the community until the mid-1900s. Low fish runs and World War II caused most of the population to move away. In recent years, the population has begun to grow with fishers, retirees, and a few vacationers. Educational services are the main economic sector of Meyers Chuck, followed by fishing, transportation, communications, utilities, and retail trade. All employment is highly seasonal. Subsistence is important to the livelihood of residents, with subsistence gathered resources comprising about half of the household food supply for residents of the community.

The annual harvest of subsistence resources was 414 pounds per capita in 1987. This total consisted of 21 lbs. of deer, 37 lbs. of other mammals, 105 lbs. of salmon, 227 lbs. of finfish and shellfish, and 24 lbs. of other resources harvested. The average Meyers Chuck household derived 45 percent of its meat and fish from subsistence activities in 1987. Deer constituted 5 percent of the total subsistence harvest in 1987.

Figure 3-18
Kake Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-19 displays TRUCS data showing where more than 10 percent of Meyers Chuck households harvest deer, where 1 to 10 percent of Meyers Chuck households harvest deer, and which areas are the most reliable and most often used for deer hunting.

In the 1988 TRUCS survey, Corner Bay was identified as an area used for deer hunting. However, Meyers Chuck residents did not harvest any deer from the Project Area for the years 1987 through 1990.

Petersburg

Located in the east-central portion of Southeast Alaska, Petersburg is situated on the northwest shore of Mitkof Island at the north end of Wrangell Narrows and approximately 130 miles from the Project Area. The 1990 population was reported as 3,207. Ten percent of the population is Native. Per capita income of Petersburg residents in 1987 was reported as $12,602.

Founded by Norwegian Peter Buschmann in 1899, Petersburg incorporated in 1906. More Norwegians followed and settled into a Scandinavian-style community. Petersburg grew around a cannery, and the site quickly became a center for fishing, fish processing, and transportation. A sawmill was added along with a packing house and docks. Except for a slight decline in the 1950s, continual growth has occurred in Petersburg through the years. Petersburg's main economic sector is seafood processing and manufacturing; government is the second largest employer. Retail trade, construction, timber, and tourism make up other economic sectors. Employment is seasonal in most sectors.

Local subsistence resource use includes deer, bear, moose, salmon, other finfish, waterfowl, clams, crabs, and berries. The annual harvest of subsistence resources in 1987 was 203 pounds per capita: 45 lbs. of deer, 19 lbs. of other mammals, 46 lbs. of salmon, 80 lbs. of finfish and shellfish, and 13 lbs. of other resources. The average household in Petersburg derived 31 percent of its meat and fish from subsistence activities in 1987. Deer constituted 22 percent of Petersburg's total subsistence harvest in 1987.

The beach fringe and extending inland in Saltery, Crab, and Kadashan bays were identified as important deer use areas in Tenakee Inlet. Some small patches along Chatham Strait, White Rock, and Basket Bay were identified in TRUCS as deer use areas. Beach fringe along False Island, Broad Island, and Finger Creek were identified as deer use areas in Peril Strait. Figure 3-20 displays TRUCS data showing where more than 10 percent of Petersburg households harvest deer, where 1 to 10 percent of Petersburg households harvest deer, and which areas are the most reliable and most often used for deer hunting.

In 1987, Petersburg residents harvested 8 percent of the deer kill from WAA 3308 along Chatham and Peril Straits. In 1988, the community did not harvest any deer in the Project Area; however, in 1989, 7 percent of Petersburg's total deer harvest for that year was taken in WAAs 3308 and 3309. In 1990, 3 percent of Petersburg's deer harvest was taken from these WAAs.

Petersburg's deer harvest from the Project Area comes from WAAs 3308 and 3309. Petersburg residents harvested a mean of 4 percent of their total harvest within Project Area WAAs between 1987 and 1990. This accounts for 7 percent of the harvest from Project Area WAAs.

Figure 3-19
Meyers Chuck Subsistence Deer Hunting Areas

Mapscale 1:250000

- More than 10% households harvest deer
- 1 - 10% households harvest deer
- Most reliable, most often used areas
- Previously cut areas
- Approved cut units

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-20
Petersburg Subsistence Deer Hunting Areas

Mapscale 1:250000

More than 10% households harvest deer

1 - 10% households harvest deer

Most reliable, most often used areas

Previously cut areas

Approved cut units

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Sitka

Sitka is located in northern Southeast Alaska on the west side of Baranof Island approximately 48 nautical from the Project Area. The 1990 Sitka borough population was reported as 8,588. Twenty-one percent of the population is Native. Per capita income of Sitka residents in 1987 was reported as $14,572.

The Sitka area was originally settled by Tlingit Indians. Sitka became the focal point of Russian fur trade in North America beginning in 1741. Sitka was the capital of Russian America until 1867 when Alaska was purchased by the United States. It became the capital of the territorial government from 1884 to 1906 when the capital moved to Juneau. After fur trade, fishing and fish processing dominated Sitka's economy for a time. Currently, Sitka's economy is based on pulp manufacture (since the 1960s); tourism; education (Mt. Edgecumbe boarding school, Sheldon Jackson College, and University of Alaska Southeast); commercial fishing; and government. Nearly equal numbers of people are employed in health and social services, retail trade, and educational services with smaller numbers employed in fisheries and wood processing. Sitka's fishing, tourism, and construction economic sectors are seasonal.

Sitka

Sitka residents harvest a wide variety of resources including deer, bear, seal, waterfowl, furbearers, salmon, shellfish, and marine fish, among others. In 1987, the annual harvest of subsistence resources was 139 lbs. per capita. This amounted to 38 lbs. of deer, 2 lbs. of other mammals, 38 lbs. of salmon, 56 lbs. of finfish and shellfish, and 5 lbs. of other resources. The average Sitka household derived 24 percent of its meat and fish from subsistence activities in 1987. Deer comprised 27 percent of the subsistence harvest in 1987.

Sitka residents identify beach fringe and inland from Long Bay on down to Trap Bay in Tenakee Inlet as deer use areas. The beach fringe and inland from Little Basket Bay in Chatham Strait over to Broad Finger Creek in Peril Strait are also identified as deer use areas.

Figure 3-21 displays TRUCS data showing where more than 10 percent of Sitka households harvest deer, where 1 to 10 percent of Sitka households harvest deer, and which areas are the most reliable and most often used for deer hunting.

The percent of the total deer harvested by Sitka residents from the Project Area (WAAs 3308, 3309, 3627, 3629) was 7 percent in 1987, 6 percent in 1988, 5 percent in 1989, and 8 percent in 1990.

Sitka's deer harvest from the Project Area comes mostly from WAA 3309. WAAs 3308 and 3629 are also important. WAA 3627 gets some use and WAAs 3628 and 3630 showed no harvest. On the average for years 1987 through 1990, Project Area WAAs supplied 7 percent of Sitka's deer. This accounts for 35 percent of the harvest from Project Area WAAs.

Skagway

Skagway is located at the extreme northern end of Lynn Canal in northern Southeast Alaska approximately 100 miles from the Project Area. The 1990 population was reported as 692. Five percent of the population is Native. Per capita income of Skagway residents in 1987 was reported as $12,295.

Skagway developed as a gold rush town serving as a starting point for miners accessing the Klondike gold fields over the White Pass route. Skagway became the first incorporated city in Alaska in 1900. At one time, it was Alaska's largest city. Today, a 6-block area of downtown Skagway is included in Klondike Gold Rush National Historical Park and attracts many tourists annually. The community's economy is centered around trans-shipment, tourism, and government services. Employment is highly seasonal in all sectors.

Skagway residents harvested a total of 52 lbs. per capita of subsistence resources in 1987. This amounted to 3 lbs. of deer, 7 lbs. of other mammals, 18 lbs. of salmon, 28 lbs. of finfish and shellfish, and 2 lbs. of other resources. The average Skagway household derived 9 percent of its meat and fish from subsistence activities in 1987. Deer comprised 6 percent of the subsistence harvest in 1987.

Skagway residents identify the beach fringe and estuaries in Seal, Crab, and Trap Bays for deer hunting use. Figure 3-22 displays TRUCS data showing where more than 10 percent of Skagway households harvest deer, where 1 to 10 percent of Skagway households harvest deer, and which areas are the most reliable and most often used for deer hunting.

In 1987 and 1988, Skagway residents reported no deer harvest from the Project Area. In 1989, Skagway residents harvested 39 percent of their deer from the Project Area, specifically from WAA 3629. In 1990, 5 percent of Skagway's deer harvest came from WAA 3629. During the period 1987 through 1990, Skagway residents' deer harvest from Project Area WAAs comprised from 0 to 39 percent of their harvest. Project Area WAAs were harvested from in 2 of those 4 years.

Skagway's deer harvest from the Project Area comes from WAA 3629. On the average, Project Area WAAs supply 15 percent of Skagway's deer between 1987 and 1990. Skagway's harvest accounted for less than 1 percent of the harvest from Project Area WAAs.

Figure 3-21
Sitka Subsistence Deer Hunting Areas

Mapscale 1:250000

More than 10% households harvest deer

1 - 10% households harvest deer

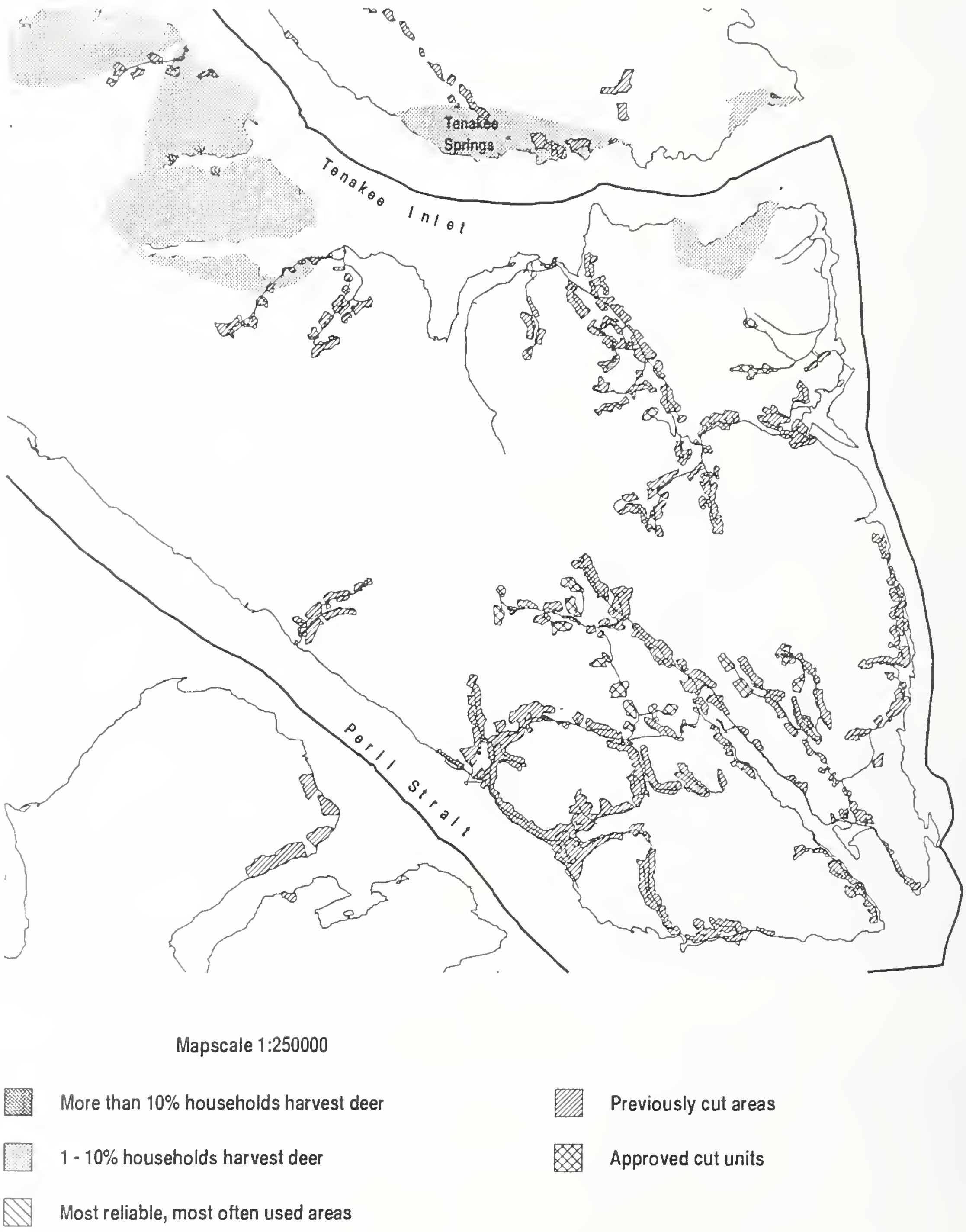
Most reliable, most often used areas

Previously cut areas

Approved cut units

SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Figure 3-22
Skagway Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Tenakee Springs

Tenakee Springs is the closest rural community to the Project Area. Tenakee is located approximately 4 nautical miles north of the Project Area across Tenakee Inlet. The 1990 population is reported as 94. Ten percent of the population is Native. Per capita income of Tenakee Springs residents in 1987 was reported as $9,080.

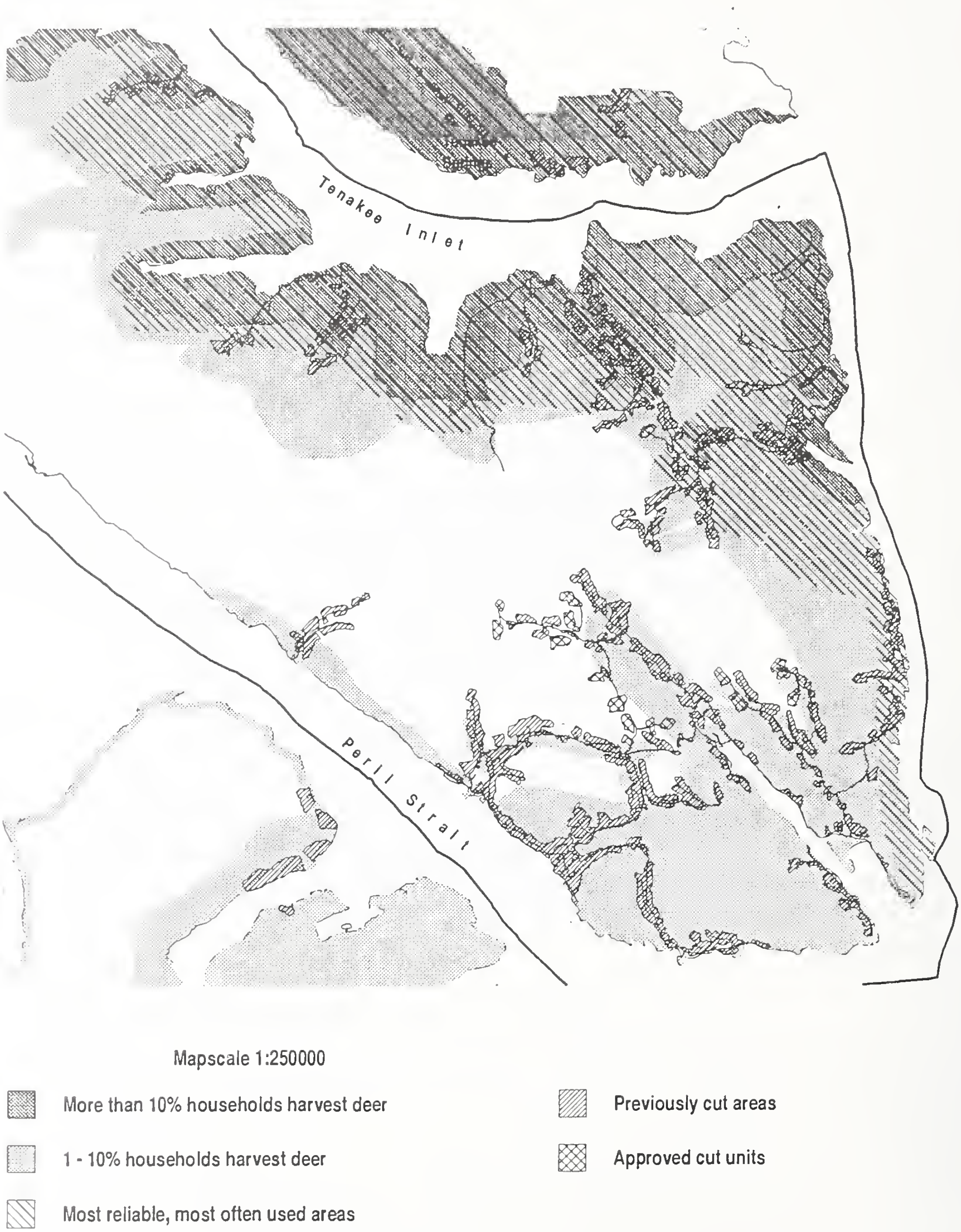
Historically, Tenakee Springs was a favorite wintering spot for early prospectors and was probably used as a seasonal Tlingit village before the arrival of the prospectors. A permanent community eventually developed with fishing and fish processing the major source of employment. Logging began at nearby Corner Bay and along the Indian River Road in the early 1970s and continues intermittently. Tenakee has the highest percentage of senior citizens of any community in Alaska. Tenakee is popular with area people, has numerous vacation homes, and is a favorite stop for boaters. The major employers of Tenakee Springs are fisheries, retail trade, and local government, with all sectors except government being highly seasonal.

Tenakee Springs

In pursuing traditional subsistence resources, Tenakee Springs residents hunt deer, bear, and seals; catch salmon and other finfish; collect shellfish; and trap furbearers. The annual harvest of subsistence resources was 343 pounds per capita in 1987. This amounted to 135 lbs. of deer, 8 lbs. of other mammals, 49 lbs. of salmon, 140 lbs. of finfish and shellfish, and 11 lbs. of other resources. The average Tenakee household derived 42 percent of its meat and fish from subsistence activities in 1987. Deer comprised 39 percent of the subsistence harvest.

Tenakee Springs residents identified the beach fringe and inland from Long Bay in Tenakee Inlet on down to Sitkoh Bay as deer-use areas. Figure 3-23 displays TRUCS data showing where more than 10 percent of Tenakee Springs households harvest deer, where 1 to 10 percent of Tenakee Springs households harvest deer, and which areas are the most reliable and most often used for deer hunting.

Figure 3-23
Tenakee Springs Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

WAAs 3327, 3628, 3629, and 3630 provided Tenakee Springs residents 33 percent of the community's total deer kill for 1987, 35 percent in 1988, 24 percent in 1989 and 38 percent in 1990. A mean of 33 percent of Tenakee's total deer harvest came from Project Area WAAs for the period 1987 through 1990. Tenakee's harvest averaged only 4 percent of the total harvest taken from WAAs in the Project Area during those years.

Wrangell

Wrangell, located in the east-central portion of Southeast Alaska, is on the northern tip of Wrangell Island, about 7 miles from the mouth of the Stikine River and approximately 148 miles from the Project Area. The 1990 population is reported as 2,479. Twenty percent of the population is Native. Per capita income of Wrangell residents in 1987 was reported as $11,989.

Wrangell began as an important Tlingit site primarily because of its proximity to the Stikine River. Wrangell clans held a monopoly of trading rights along the Stikine. The flags of three nations—England, Russia, and the United States—have flown over this community. The late 19th century saw Wrangell become a supply center for gold miners and prospectors during three gold rushes. Today, timber, fishing, and fish processing dominate Wrangell's economy. More than 100 residents fish commercially, and for nearly 50 percent of them it is their major source of income. Tourism is also a growing economic influence in the area.

Wrangell residents hunt deer, bear, moose, and waterfowl; fish for salmon, halibut, and other finfish; and gather shellfish and berries. The annual harvest of subsistence resources was 164 pounds per capita in 1987. Subsistence harvest was comprised of 21 lbs. of deer, 24 lbs. of other mammals, 30 lbs. of salmon, 84 lbs. of finfish and shellfish, and 6 lbs. of other resources. The average Wrangell household derived 23 percent of its meat and fish from subsistence activities in 1987. Deer comprised 13 percent of Wrangell's subsistence harvest in 1987.

The community of Wrangell has identified the beach fringe and estuaries from Seal, Saltery, Crab, and Trap Bays as important deer-use areas. From Basket Bay in Chatham Strait over to Finger Creek in Peril Strait, the beach fringe is also identified for deer hunting use by Wrangell residents.

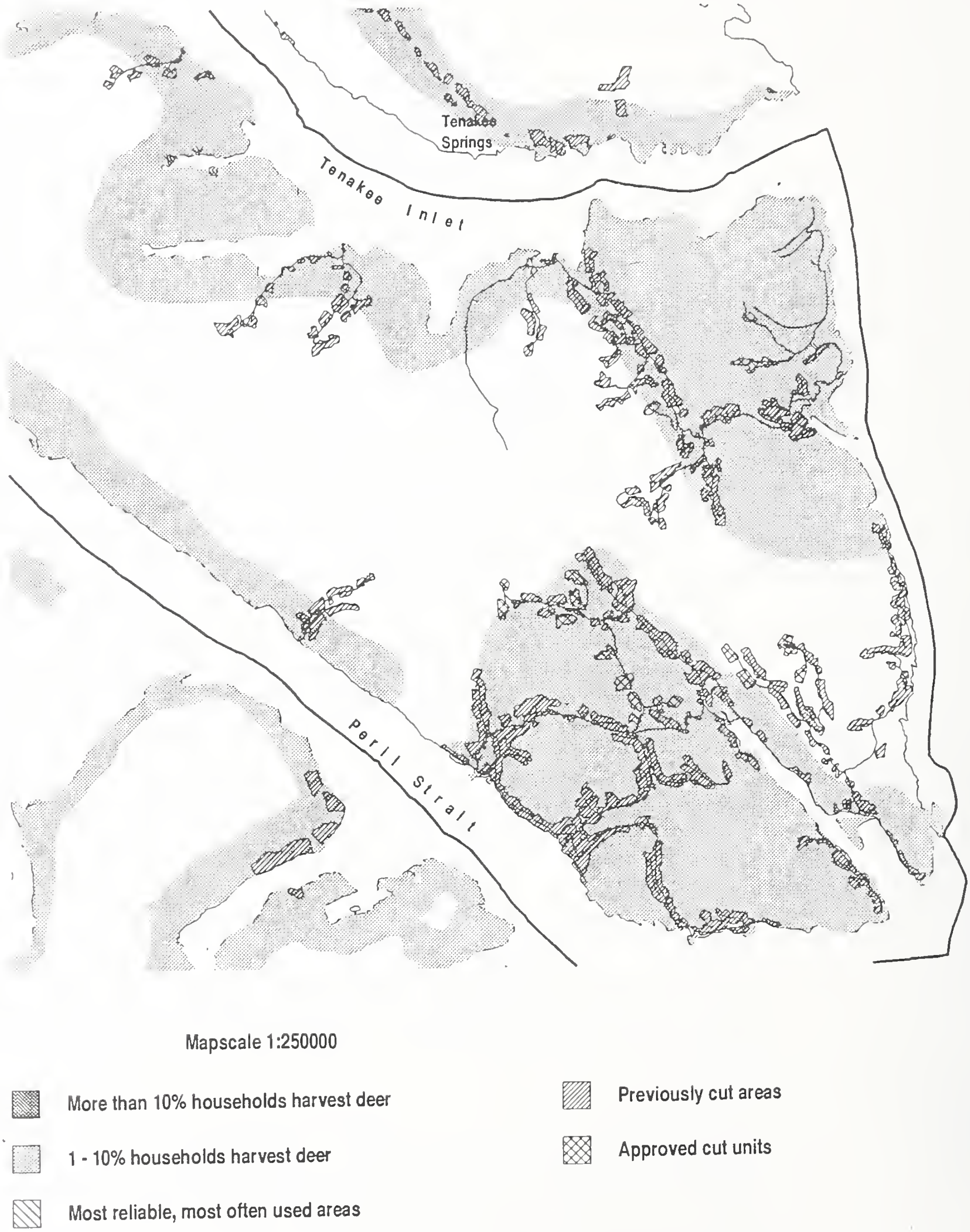
Figure 3-24 displays TRUCS data showing where more than 10 percent of Wrangell households harvest deer, where 1 to 10 percent of Wrangell households harvest deer, and which areas are the most reliable and most often used for deer hunting.

For the years 1987 to 1989, Wrangell residents did not harvest any deer from the Project Area. In 1990, five deer were harvested from WAA 3308 by Wrangell residents. This comprised approximately 2 percent of the Wrangell harvest for 1990. Less than 1 percent of Wrangell's total deer harvest came from Project Area WAAs for the period 1987 through 1990. Wrangells' harvest accounted for less than 1 percent of the harvest from Project Area WAAs during the period 1987 through 1990.

Summary

The communities of Angoon, Haines, Hoonah, Juneau, Kake, Ketchikan, Meyers Chuck, Petersburg, Sitka, Skagway, Tenakee Springs, and Wrangell were determined to be communities which are most likely to harvest resources from the Project Area. All of these communities are designated rural except Juneau and Ketchikan. Tenakee Springs appears to be the most dependent on the Project Area for its deer harvest, deriving a third of its total harvest from the Project Area for the years 1987 through 1990. Tenakee Springs is geographically the closest community to the Project Area.

Figure 3-24
Wrangell Subsistence Deer Hunting Areas



SOURCE: J. Kruse 1991. Information derived from TRUCS database.

Haines and Skagway are relatively far (over 100 miles north) from the Project Area; however, Project Area WAAs account for a relatively large percentage (18 and 16 percent respectively) of their average deer harvest. During the period 1987 through 1990, Haines residents harvested deer from Project Area WAAs each of those years and Skagway residents harvested deer in 2 of the 4 years. Other rural communities deriving a significant proportion of their deer harvest from the Project Area are Angoon (9 percent), Sitka (7 percent), and Petersburg (4 percent). Juneau residents derive 8 percent of their total deer harvest from the Project Area. Juneau's harvest comprises and average of 37 percent of the deer harvest from Project Area WAAs. A total of 41 percent of the deer harvest from Project Area WAAs is taken by nonrural resi dents.

Rural communities comprising a significant proportion of the average harvest from Project Area WAAs include Sitka (35 percent), Haines (8 percent), Petersburg (7 percent), Tenakee (4 percent), and Angoon (3 percent).

Netting Eulachan

Roads

The Southeast Chichagof Project Area contains no state highways, ferry terminals, or airports. Current Southeast Alaska transportation development plans do not include any such facilities within the foreseeable future. There are no established communities in the Project Area. There are two active logging camp located in the Project Area—Corner Bay and False Island. A few roads access the interior of the area, but these are not linked to any inter-island transportation network. Consequently, timber harvest and related forest management activities are the primary purposes for transportation development. APC does not have a policy restricting camp residents from using their own vehicles in the Project Area. However, because of the high cost of transporting a conventional vehicle to the logging camp, few vehicles other than logging company vehicles are found in the Project Area. Minor amounts of ATV use occurs on the road systems in Corner Bay, False Island, and Sitkoh Bay.

Kook Lake Road

Currently, there are 179.6 miles of roads (Table 3-46) or an average road density of 0.40 miles of road per square mile of land in the Project Area (Table 3-47). Existing roads in VCUs 235, 236, 238, and 239 connect to the Corner Bay LTF, to the logging camp in VCU 236, and to the Kook Lake trail accessing the recreational cabin in VCU 239. Roads in VCUs 240, 241, 242, 243, 244, and 245 interconnect the Sitkoh Bay, False Island, and Todd LTFs. At present, there is no road connection between the Corner Bay road system and the road system serving False Island and Sitkoh Bay in the southern portion of the Project Area, nor is either of these systems connected to the road systems of Crab Bay (VCU 233/234), Inbetween Creek (VCU 230), or Oly Creek (VCU 246).

Of the 179.6 miles of existing roads in the Project Area, 30.0 miles are arterial, 65.3 miles are collector, and 84.3 miles are local (see the Glossary for definitions of arterial, collector, and local roads). These roads connect to LTFs at Crab Bay, Inbetween, Corner Bay, Todd, Sitkoh Bay, False Island, and Oly Creek. As a result of alder growth, water barring, and the removal of culverts and temporary bridges, some of the existing roads are impassible while other recently reconstructed or maintaned roads are in very good condition.

Table 3-46
Southeast Chichagof Existing Roads (by Length and Type, in miles)

VCU	Existing Roads A[1]	Existing Roads C[2]	Existing Roads L[3]	Total Miles
227	0	0	0	0
228	0	0	0	0
229	0	0	0	0
230	0	3.3	0.7	4.0
231	0	0	0	0
232	0	0	0	0
233	0	5.4	1.3	6.7
234	0	1.8	4.4	6.2
235	5.8	0	0	5.8
236	6.9	2.3	10.9	20.1
237	0	0	0	0
238	0	5.5	10.3	15.8
239	1.9	7.5	12.5	21.9
240	0	0	0	0
241	0	5.4	1.8	7.2
242	0	4.0	13.2	17.2
243	8.3	10.3	18.8	37.4
244	1.4	7.9	3.4	12.7
245	5.7	11.9	7.0	24.6
246	0	0	0	0
Totals	30.0	65.3	84.3	179.6

SOURCE: Kosak and Allio 1991.

A[1] = Arterial
C[2] = Collector
L[3] = Local

Table 3-47
Current Road Density Within the Southeast Chichagof Project Area

VCU	Existing Road Miles	Square Miles	Road[1] Density
227	0.0	5.98	0.0
228	0.0	29.11	0.0
229	0.0	35.25	0.0
230	4.0	14.68	0.27
231	0.0	29.57	0.0
232	0.0	17.59	0.0
233	6.7	15.78	0.42
234	6.2	9.07	0.68
235	5.8	52.58	0.11
236	20.1	17.23	1.17
237	0.0	10.38	0.0
238	15.8	15.54	1.02
239	21.9	27.10	0.81
240	0.0	14.66	0.0
241	7.2	11.94	0.60
242	17.2	17.90	0.96
243	37.4	42.51	0.88
244	12.7	19.19	0.66
245	24.6	37.37	0.66
246	0.0	27.02	0.0
Totals	179.6	450.45	0.40

SOURCE: Kosak and Allio 1991.

1 Road density is defined as the miles of road per square mile of total land area.
Note: This information derived from the Chatham Area GIS.

Marine Environment and Log Transfer Facilities

Marine Environment

Southeast Alaska's coastline consists of approximately 30,000 miles (48,000 kilometers) of tidal shoreline, roughly 60 percent of the total Alaskan coast. Within this region occurs a great diversity of habitats that collectively account for the complexity of Southeast Alaska's estuary and tidal environments.

The marine environment encompasses a wide variety of ecosystems. The intertidal and subtidal marine environments are subject to effects from log transfer and storage facilities; those are the points of concentrated activity associated with the marine transportation of logs. The preferred sites for LTFs, log storage areas, camp settlements, and anchorages are deep bays or along straits or channels. Other marine areas are not addressed here because they are not expected to be affected by activities associated with the timber harvest evaluated in this document. Activities outside the areas of concentration are widely dispersed. Any potential effects would be short term and/or diluted below detectable thresholds.

The shallow marine waters and associated mud flats and estuaries found in the protected coves and bays provide vital habitat for some important species such as Dungeness crab and juvenile salmon. They are part of a complex and dynamic ecosystem that includes shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms.

Abundant marine life exists in the coves and bays of the Project Area.

The Corner Bay facility has been in operation long enough that deposited bark is a feature of this site (Fish & Wildlife Service 1983; Freese 1987). A USFWS (1983) survey of Sitkoh Bay found bark deposits at the LTF site located there. Bark deposits have also been reported at the False Island LTF (Hughes 1989). The Todd LTF has historically handled lower volumes than the other LTFs in the Project Area and is in a more exposed location with greater wind and current action that leads to greater flushing of bark. Therefore, existing bark deposits are expected to be smaller at Todd than at other LTFs in the area.

Freese (1987) indicates that once benthic deposits of bark are in place, they are very resistant to decomposition or transport away from the immediate area. Therefore, bark deposits are expected to be present even at log transfer facilities that have not been in operation recently. However, the area affected by bark is relatively restricted; for example, at 13 LTFs evaluated in Southeast Alaska, bark deposits averaged 2.4 acres per site (Freese 1987).

Log Transfer Facilities (LTFs)

There are eight log transfer facilities (LTFs) in the Project Area. The Sitkoh Bay West, Sitkoh Bay East, and Todd LTFs are currently inactive and are not proposed for use under any of the alternatives; therefore, they will not be discussed further.

Log raft

The Crab Bay LTF, located in VCU 233, was constructed in 1977 and has been inactive for approximately 12 years. It was originally constructed as a steep-angle slide facility. A camp site of approximately 5 acres was used during the operating period.

The Inbetween LTF, a temporary structure located in VCU 230, was constructed for beach bundle lift off. It was removed in 1986. A floating camp was used in this area during road construction. The logging camp at Corner Bay was used during timber harvest of this area.

The Oly Creek LTF, located in VCU 245, was constructed as an A-frame in 1974 and used through 1976. A 500-foot-long breakwater was constructed in conjunction with the LTF. This LTF has been inactive since 1976. A camp site of approximately 5 acres was cleared during the past operation of this sale area.

The Corner Bay LTF was constructed in 1974 as a steep-angle slide facility and was reconstructed in 1989 as a low-angle slide facility designed to skid log bundles directly into the water. The Corner Bay LTF is currently in use and is being maintained as a slide facility.

The False Island LTF, which was constructed in 1965, has been inactive for approximately 13 years. False Island LTF was originally constructed as an A-frame facility. This facility is a metal bulkhead A-frame. A sort yard and storage area will be constructed under the SEIS at False Island. These activities will be complete and available for use by this project if the need arises.

Logging Camps

There is an existing logging camp at Corner Bay. This camp is currently occupied year round. The population is approximately 100 persons during the operating season (depending on the size of the families that live there). Families are quartered in trailer houses. Single men are housed in the one bunkhouse on the site. Most of the population leave in the winter, leaving a year-round population of approximately 30 persons. A one-room school is operated at Corner Bay.

Associated with the logging camp at Corner Bay is a Forest Service administrative site. It consists of a self-contained building that can accommodate about 15 people. It is closed during the winter and is generally only occupied on weekdays during the logging season. It is not available for recreational use.

Corner Bay Camp

Historically, there has been a logging camp at False Island; however, most of the facilities were removed shortly after the LTF became inactive. The area was used as a Young Adult Conservation Corps (YACC) camp for a while. The YACC workers built four two-story buildings; two were used as bunkhouses and one as a mess hall, with living quarters on the second floor. In addition to these structures, there are also two prefabricated buildings; one is used as a workshop and the other for storage. The cook house and one bunkhouse at False Island will be used by the Forest Service as an administrative site and work center. The other two buildings were sold to a road builder/logging contractor who will be using these buildings as crew quarters and will be reconstructing the camp to facilitate operations. This camp will not be fully operational until the summer of 1992. Table 3-48 summaries LTF permit status for the existing LTF locations in the Project Area. The *Lands* section of this chapter provides more detailed information about these permits.

Table 3-48

Existing LTFs (Current Status of Tideland Permits—U.S. Army Corps of Engineers and State of Alaska)

LTF	COE Permit Holder	Exp. Date	AK State Holder	Easement Grant Exp. Date
Corner Bay	FS	None	FS	7-25-2008
Crab Bay	APC	None	FS	4-30-2000
False Island	FS	None	FS	5-25-89
Inbetween Creek	APC	None	FS	3-17-200104.35
Lindenberg Harbor (Todd)	FS	None	FS	7-25-2008
Sitkoh Bay (East Side)	FS	None	FS	5-1-90
Sitkoh Bay (West Side)	FS		FS	12-30-78
Oly Creek	APC	None	FS	6-1-77

SOURCE: Kosak and Allio 1991.

Note: Information derived from USFS LTF Inventory 1991.
COE = U.S. Army Corp of Engineers

Recreation

The Tongass National Forest possesses a remarkable and unique combination of features including inland waterways (with over 8,000 miles of shoreline), mountains, fiords, glaciers, and large populations of wildlife and fish, all of which provide opportunities for a wide range of recreational experiences. The Southeast Chichagof Project Area contains 286,757 acres of land, 1,544 acres of freshwater, and 177 miles of shoreline (including many small off-shore islands and rocks). Approximately 55,000 acres within the Project Area have been previously harvested and roaded. These developed lands are primarily located in the eastern half of the Project Area; however, some places of past activity are scattered throughout.

While the large acreage is impressive and contributes to the feeling of vastness and solitude, the size is also deceiving in that the amount of land area actually available and usable for outdoor recreation is limited. The difficult and steep terrain, wetlands, and heavy vegetation cover confine most of the recreational activities to the accessible shorelines, rivers, streams, and lakes, and along the major road systems which originate at Corner Bay and False Island. Other roads exist in isolated locations where timber harvest has taken place in the past; however, these roads are not connected to the major road systems. Many of these isolated roads are maintained only to the minimum standard. Little recreational use is made of these isolated road systems, and in many places alder growth on the road surface has restricted travel, leaving little more than wildlife trails.

Camping at a Forest Service camp

Recreation Opportunities

The Southeast Chichagof Project Area has the potential to provide a wide variety of recreational settings. The Forest Service uses the Recreation Opportunity Spectrum (ROS) to help identify, quantify, and describe these settings. The ROS system portrays a range of recreation activities, settings, and experiences from primitive to urban (see the Glossary for definitions of ROS and the specific ROS classes). The recreation resource within the Southeast Chichagof Project Area includes opportunities that span the primitive end of the spectrum of recreation opportunities. The ROS classes found in the Project Area are Primitive, Semiprimitive Nonmotorized, Semiprimitive Motorized, Roaded Natural, and Roaded Modified. Table 3-49 displays the acres of each ROS class for each VCU.

Table 3-49
Existing Recreation Opportunity Spectrum Classes (in acres)

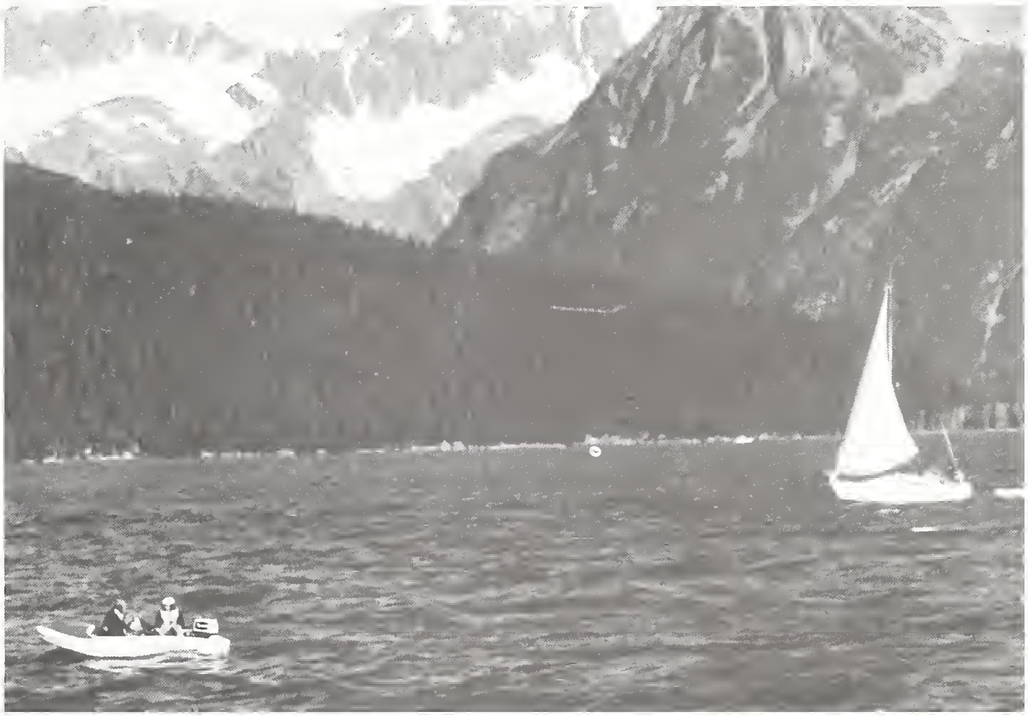
VCU	Primitive	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Total
227	3,464	172	193	0	0	3,829
228	6,516	9,794	2,319	0	0	18,629
229	9,327	10,620	1,560	0	1,053	22,560
230	0	7,086	1,320	0	990	9,396
231	0	16,842	2,083	0	0	18,925
232	0	9,349	1,910	0	0	11,259
233	689	7,931	111	0	1,371	10,102
234	0	3,826	381	0	1,600	5,807
235	10,557	20,328	2,688	0	79	33,652
236	0	4,508	282	71	6,168	11,029
237	0	5,424	1,195	0	27	6,646
238	0	5,282	5	0	4,659	9,946
239	0	9,663	891	0	6,790	17,344
240	0	9,197	187	0	0	9,384
241	0	5,727	0	0	1,913	7,640
242	0	4,014	2,193	0	5,248	11,455
243	0	14,523	601	828	11,256	27,208
244	0	6,241	651	545	4,846	12,283
245	0	12,564	3,253	0	8,100	23,917
246	15,758	750	782	0	0	17,290
Total	46,311	163,841	22,605	1,444	54,100	288,301

SOURCE: Nelson and Flynn 1991.

Recreation Places

Another aspect of recreation in the Southeast Chichagof Project Area is the 40 inventoried Recreation Places which total 72,327 acres. A Recreation Place is an identified geographic area having one or more physical characteristics or features that are particularly attractive to people engaged in recreation activities. These features may be beaches, streamside areas, road or trail corridors, or areas surrounding lakes, cabins, or anchorages. Each Recreation Place has one or more activities associated with it, such as viewing scenery or wildlife, boating, hiking, fishing, dispersed camping, and hunting. Table 3-50 lists the Recreation Places within the Project Area and some of the physical characteristics or features associated with each one. Figure 3-25 is a map which shows the location of the Recreation Places.

The Project Area has the potential to provide a wide variety of recreation opportunities.



Road Management

Some of the recreation opportunities within the Southeast Chichagof Project Area are influenced by the existence and use of roads. The condition of these roads and the management objectives for public or other use of these roads are major factors influencing the recreation settings, activities, and experiences of visitors to the Project Area. The Forest Service uses Road Management Objectives (RMOs) to provide direction for the design, maintenance, and access strategies of each road. The RMOs are developed with the recognition of their effect on recreation opportunities. Existing RMOs are displayed as Alternatives A1/A2 in Appendix I, Table I-6.

Table 3-50
Recreation Places and Their Features (including VCUs and acres)

No.	VCUs	Recreation Places	Features	Acres
1.	227	Goose Flats	Waterfowl/Big Game Hunting	765
2.	228	Long Bay Uplands	Big Game Hunting	3,610
3.	228	Long Bay Beach	Anchorage, Campsites	2,512
4.	229/230	Seal Bay	Anchorage, Shoreline	2,387
5.	229	Seal Bay Uplands North	Big Game Hunting	1,047
6.	229	Head of Seal Bay	Stream Fishing, Estuary	1,053
7.	229/230	Seal Bay Uplands South	Big Game Hunting	1,944
8.	230	Inbetween	Big Game Hunting, Scenery	329
9.	230	N. of Saltery Bay	Big Game Hunting, Scenery	162
10.	231	Saltery Bay	Anchorage, Estuary, Waterfowl Hunting	1,848
11.	231	Saltery Bay Uplands	Big Game Hunting	3,170
12.	232	Crab Bay	Rec. Residence, Campsites, Anchorage	2,257
13.	232	Crab Bay Uplands	Big Game Hunting, Stream Fishing	4,994
14.	233/234	South Crab Road System	Shoreline, Roads, Big Game Hunting	1,367
15.	234	Lower Fog Creek	Camping, Interpretive/Observation Site	381
16.	234	Upper Fog Creek	Big Game Hunting	568
17.	235	Kadashan Bay	Campsites, Road, ATV, Stream Fishing	2,941
18.	235	Kadashan Bay Uplands	Big Game Hunting, Stream Fishing	3,353
19.	236	Strawberry Island	Scenery, Campsite, Saltwater Fishing	2
20.	236	Corner Bay East Point	Campsite, Big Game Hunting, Scenery	65
21.	236/239	Corner Bay Road System	Rec. Residence, Anchorage, Road, Trail	12,044
22.	239	Basket Bay North Shore	Camping, Stream Fishing, Big Game Hunting	410
23.	239	Kook Lake	Trail, Rec. Cabin, Stream/Lake Fishing	1,029
24.	238	Buckhorn	Shoreline, Stream/Saltwater Fishing, Road	222
25.	239	Basket Bay South Shore	Camping, Stream Fishing, Anchorage	481
26.	240	Basket Lake	Potential Trail/Cabin Sites, Fishing	3,149
27.	240	Little Basket Bay	Campsite, Salt/Freshwater Fishing, Shoreline	187
28.	241	Little Basket Lake	Stream/Lake Fishing, Camping	1,006
29.	241	Florence Bay Road North	Roads, Big Game Hunting, Hiking, ATV	1,913
30.	242	North of White Rock	Roads, ATV, Beachcombing, Hiking	25
31.	243	Sitkoh Bay	Roads, Anchorage, ATV, Big Game Hunting	4,754
32.	244/245	False Island Road System	Anchorage, Rec. Cabin, ATV, Roads	6,651
33.	244	Sitkoh Creek	Trail, Rec. Cabin, Fishing Site, Roads	1,677
34.	245	Lindenberg Head	Anchorage, ATV, Camping, Roads	1,306
35.	246	Upper Broad Creek	Big Game Hunting, Stream Fishing	625
36.	246	Lower Broad Creek	Anchorage, Sream Fishing, Beachcombing	283
37.	246	Upper Broad Finger Creek	Stream Fishing, Big Game Hunting	541
38.	246	Lower Broad Finger Creek	Stream/Ocean Fishing, Big Game Hunting	188
39.	246	Hot Springs	Undeveloped Springs	5
40.	237	Trap Bay	Big Game Hunting, Shoreline	1,236
Total				72,487

SOURCE: Nelson and Flynn 1991.

Figure 3-25
Southeast Chichagof Project Area Recreation Places

SOURCE: Nelson 1991.

Recreation Use

Recreation use of the Southeast Chichagof Project Area depends almost entirely on access by or from salt water. Float planes can land on four of the largest lakes: Kook, Basket, Little Basket, and Sitkoh; and air taxi service is available on a charter basis. Tenakee Springs, with a population of 95 (USDC 1991), lies 4 miles from the Project Area. Angoon, population 540 (USDC 1991), lies 16 miles from the Project Area. Both communities have Alaska Marine Highway service. A few roads access the interior of the Project Area but are not linked to any inter-island transportation network. Recreational use of the area by nonresidents is infrequent, and the requirement for access by salt water eliminates traditional roaded recreation activities. ATV use by both residents and nonresidents has increased in recent years.

Popular recreation activities in the general area include picnicking, camping, hiking, photography, beach activities, and boating by either kayak, canoe, or motorboat. Recreationists also enjoy viewing and hunting wildlife, including big game, small game, and waterfowl. Fishing takes place along shorelines, streams, and lakes. Winter sports include cross-country skiing and snowmobiling. Some outfitter and guide permits allow guides to charter throughout the Forest. Available charters include bear hunting, fishing, and wildlife viewing trips.

Even without additional timber harvest, the opportunity exists throughout the Southeast Chichagof Project Area to use the old road systems for foot travel and/or ATV use. The road system starting at False Island is extensive and is being reconstructed. It gets used by people on ATVs who are hunting for bear and deer. Trails allow hunters and hikers access to inland areas.

The Forest Service has a recreation cabin at Kook Lake in VCU 239. The Kook Lake cabin is accessible on foot a short distance off the Corner Bay road system.

Existing recreation use can be utilized to project demand for recreation opportunities in the future. Demand for all ROS classes is growing, and the biggest growth is in the Semiprimitive Motorized setting. On both the Tongass National Forest generally and in the Project Area specifically it appears that demand can be met into the future for all of the ROS classes except in the Semiprimitive Motorized class. It also appears that demand will exceed supply for this setting by the end of the decade.

Recreation Special Use Permits

There are approximately 13 Recreation Special Use permits that include the Project Area. Most of these permits are issued to outfitters and guides. Wildland guided hunting and fishing, sightseeing, photography, and wildlife viewing are the recreational opportunities advertised by these guides. Most of the guides access the area by boat. There is an isolated cabin used for recreation and hunting located in Crab Bay approximately one mile from the Crab Bay LTF.

Visual Quality

An important aspect of Southeast Alaska's natural resource base is its attractive setting. The importance of the scenic splendor of the area is evident by increased tourism and a heightened awareness of and sensitivity to scenic resource values by Alaska's residents. The methodology used to evaluate the scenic qualities of the Southeast Chichagof Project Area is the Forest Service Visual Management System. The Visual Management System provides the framework within which to inventory the visual resource and provide measurable standards for its management. The inventories include determination of Visual Quality Objectives (VQOs) and Existing Visual Condition (EVC).

Inventoried Visual Quality Objectives (VQOs)

These are a set of measurable goals for the management of forest visual resources. VQOs are based upon an evaluation of viewer sensitivity levels, distance zones (see Glossary for foreground, middleground, background) and landscape variety classes, and describe the different degrees of acceptable alteration of the natural landscape. VQOs consist of the following classifications:

- Preservation - Allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited. The preservation VQO is typically applied to designated wilderness or classified areas only.

- Retention - Provides for management activities which are not visually evident. Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident. Mitigating measures used to meet this objective should be accomplished either during operation or immediately after. Measures may include seeding vegetative clearings and cut/fill slopes, hand planting of large stock, painting structures, etc.

- Partial Retention - Provides for management activities to remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape. Mitigating measures should be accomplished within one year of project completion.

- Modification - Management activities may visually dominate the characteristic landscape. However, activities of vegetative and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

- Maximum Modification - Management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middleground they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences. Mitigating measures should be accomplished within 5 years of project completion.

Inventoried VQOs form the benchmark from which determinations can be made regarding the visual fitness of management activities on the landscape. They are mapped for all the VCUs included in the Project Area, whether or not specific management activities are proposed. In the Southeast Chichagof study area, 3 percent of the total 288,301 acres are Retention, another 39 percent is classified Partial Retention, 41 percent classified Modification, and the remaining 17 percent is classified Maximum Modification. VQOs and acreages for the individual VCUs are shown in Table 3-51.

Table 3-51
Inventoried Visual Quality Objectives Within the Southeast Chichagof Project Area

VCU	R[1] Acres	R[1] %	PR[2] Acres	PR[2] %	M[3] Acres	M[3] %	MM[4] Acres	MM[4] %	Total Acres
227	0	0	252	7	3,577	93	0	0	3,829
228	0	0	2,220	12	11,789	63	4,260	25	18,629
229	0	0	1,890	8	13,070	58	7,600	34	22,560
230	0	0	1,517	16	7,781	83	98	1	9,396
231	244	1	6,184	33	2,833	15	9,664	51	18,925
232	0	0	2,530	23	2,597	23	6,132	54	11,259
233	396	4	2,302	23	3,262	32	4,142	41	10,102
234	0	0	3,432	59	1,304	23	1,071	18	5,807
235	0	0	10,432	31	20,864	62	2,356	7	33,652
236	669	6	6,940	63	3,048	28	372	3	11,029
237	1,821	27	4,770	72	55	1	0	0	6,646
238	1,991	20	6,304	63	1,589	16	62	<1	9,946
239	2,910	17	9,569	55	4,278	25	587	3	17,344
240	0	0	3,161	34	4,517	48	1,706	18	9,384
241	0	0	5,172	68	2,431	32	37	<1	7,640
242	367	3	5,103	45	5,985	52	0	0	11,455
243	8	<1	7,155	26	18,450	68	1,595	26	27,208
244	1,027	8	9,333	76	1,913	16	0	0	12,283
245	16	<1	18,081	75	5,718	24	102	<1	23,917
246	307	2	6,214	36	3,405	20	7,364	42	17,290
Total	9,766	3	112,561	39	118,466	41	47,508	17	288,301

SOURCE: Monaco & Loeffler 1992.

[1]R = Retention
[2]PR = Partial Retention
[3]M = Modification
[4]MM = Maximum Modification

Existing Visual Condition (EVC)

EVC represents the level of visual quality or condition currently occurring on the ground. It is measured in terms of condition types I, II, III, IV, V, and VI. Existing visual condition stratifications are described in terms similar to those used to describe VQOs, however, specific terms such as preservation, retention, partial retention, etc., are not used because they connote management goals or objectives rather than inventoried conditions. EVC serves as a tool in issue identification, analysis of the management situation, estimation of effects of alternatives, monitoring, and as a historical record of the degree and amount of physical alteration of the landscape.

Type I	Areas in which only ecology change has taken place except for trails needed for access. They appear to be untouched by human activities (natural appearing).
Type II	Areas in which changes in the landscape are not noticed by the average person unless pointed out. They appear to be unnoticed.
Type III	Areas in which changes in the landscape are noticed by the average forest visitor, but they do not attract attention. The natural appearance of the landscape still remains dominant. They appear to be minor disturbances.
Type IV	Areas in which changes in the landscape are easily noticed by the average forest visitor and may attract some attention. They appear to be disturbances but resemble natural patterns.
Type V	Areas in which changes in the landscape are strong and would be obvious to the average forest visitor. These changes stand out as a dominating impression of the landscape. Yet they are shaped so that they might resemble natural patterns when viewed from 3 to 5 miles or more distant. They appear to be major disturbances.
Type VI	Areas in which changes in the landscape are in glaring contrast to the natural appearance. Almost all forest visitors would be displeased with the effect. They appear to be drastic disturbances.

Project Area waters offer significant fishing

Table 3-52 displays VCUs and their corresponding EVC types as they currently appear.

Table 3-52
Existing Visual Condition

VCU	I Acres	I %	II Acres	II %	III Acres	III %	IV Acres	IV %	V Acres	V %	VI Acres	VI %	Total Acres
227	3,829	100	0	0	0	0	0	0	0	0	0	0	3,829
228	18,629	100	0	0	0	0	0	0	0	0	0	0	18,629
229	21,765	96	0	0	0	0	0	0	795	4	0	0	22,560
230	7,218	77	0	0	0	0	213	2	1,965	21	0	0	9,396
231	15,976	77	0	0	0	0	2,949	16	0	0	0	0	18,925
232	9,572	85	0	0	0	0	1,680	15	7	<1	0	0	11,259
233	6,340	63	0	0	0	0	5	<1	3,757	37	0	0	10,102
234	2,769	48	0	0	0	0	0	0	3,038	52	0	0	5,807
235	28,267	84	5,385	16	0	0	0	0	0	0	0	0	33,652
236	3,898	36	0	0	810	7	0	0	6,321	57	0	0	11,029
237	4,918	74	133	2	0	0	1,595	24	0	0	0	0	6,646
238	5,271	53	100	1	0	0	4,575	46	0	0	0	0	9,946
239	9,021	52	0	0	0	0	0	0	8,323	48	0	0	17,344
240	9,270	99	0	0	0	0	0	0	114	1	0	0	9,384
241	4,685	61	0	0	0	0	0	0	2,955	39	0	0	7,640
242	2,946	26	18	<1	0	0	0	0	8,491	74	0	0	11,455
243	12,437	46	352	1	0	0	625	2	13,388	50	406	1	27,208
244	4,134	34	0	0	0	0	0	0	973	8	7,176	58	12,283
245	8,460	35	0	0	0	0	212	<1	6,360	27	8,885	37	23,917
246	17,252	99	0	0	0	0	0	0	38	<1	0	0	17,290
Total	196,657	68	5,988	2	810	<1	11,854	4	56,525	20	16.467	5	288,301

SOURCE: Monaco and Loeffler 1991.

Lands

This section presents descriptions of current land ownership, claims, withdrawals, and permits.

Private Lands

The Southeast Chichagof Project Area contains primarily National Forest System lands with only four parcels of private land or lands of other ownership:

1) Hoonah Sound Village located in VCU 246; 8.80 acres conveyed 9/29/86 to Sealaska Corporation under authority of Section 14(h)(1) of the Alaska Native Claims Settlement Act of 1971 (ANCSA).

2) Basket Bay Village located in VCU 239 (Basket Bay); 14.54 acres conveyed 9/30/86 to Sealaska Corporation under authority of Sec. 14(h)(1), ANCSA.

3) Sitkoh Creek Petroglyphs located in VCUs 243 and 244 (Sitkoh Creek); 17.50 acres conveyed 9/30/86 to Sealaska Corporation under authority of Sec. 14(h)(1), ANCSA; two easements reserved under authority of Sec. 17(d)(3), ANCSA:

   - 25 ft. wide easement for an existing trail
   - 100 ft. wide easement for a proposed road

4) Chatham Cannery located in VCU 243 (Sitkoh Bay); 40.06 acres patented 1/20/08 as a precreation (before creation of Tongass National Forest) Soldier's Homestead to Christian Buschmann under authority of the Act of May 14, 1898.

State and Native Claims

State Selections

The Alaska Statehood Act of 1959 authorized the State of Alaska to select 400,000 acres of National Forest system lands. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) provides that the State has until 1994 to complete its selections and that the State may select lands in excess of its remaining entitlement. However, only the actual entitlement will be conveyed from these selected lands.

The State of Alaska has completed its National Forest selection process and most of the land requested has been approved by the Forest Service. At this time, no State selections occur within the Project Area. Minor changes in selected lands may occur in the future if the State relinquishes some acres and replaces them with selections in other locations prior to the 1994 deadline.

Native Selections

The Alaska Native Claims Settlement Act of 1971 (ANCSA) provided for conveyance of certain lands to the ten Native village corporations, the two Native urban corporations, and the one Native regional corporation located in Southeast Alaska. The U.S. Department of Interior Bureau of Land Management issued regulations authorizing these corporations to select lands in excess of their entitlements. However, as with State selections, only the actual entitlement will be conveyed. Although all of the Native selections have been made, this process is not complete.

VCUs 239 to 243 and 245 contain Native selections within the Long-term Timber Sale Contingency Area. The eastern portion of these VCUs are within the Angoon Withdrawal and have been selected by both Sealaska Corporation and Kootznoowoo, Inc. Section 908 of ANILCA provides that these lands may not be entered by the timber contractor nor can the timber be cut except by agreement with the Native corporations, so long as they have remaining entitlement. At last account, Kootznoowoo, Inc. had over 3,000 acres remaining entitlement and Sealaska Corporation has approximately 75,000 acres.

There are four Native selections in the Project Area:

1) Kootznoowoo Inc. selection located in VCUs 239, 243, and 245 (White Rock); T49S, R66E, T50S, R66E, T51S, R66E; CRM—selected under authority of ANCSA.

2) Kootznoowoo, Inc. has selection rights to 20 contiguous acres within Sections 29 to 33, T48S, R65E; CRM at Basket Bay (VCU 239), subject to valid existing rights and designation of a trail easement as provided in Section 506(a)(4) of the Alaska National Interest Lands Conservation Act of December 2, 1980 (ANILCA).

3) Sealaska Corporation selection located in VCUs 239, 243, and 245 (White Rock); T49S, R66E, T50S, R66E, T51S, R66E; CRM—selected under authority of ANCSA.

4) Sealaska Corporation Historic Place selection located in VCU 245; selected under authority of ANCSA.

Native Allotments

The Alaska Native Allotment Act of 1906 provided that Native individuals who had occupied lands prior to the designation as National Forest could apply for conveyance of up to 160 acres. ANCSA repealed the Native Allotment Act, eliminating future allotments.

Currently, there are two Native allotment applications pending in the Project Area:

1) One is located in VCU 243 (Sitkoh Bay); applied 4/6/87 under authority of the Alaska Native Allotment Act of 1906; occupancy since 1938.

2) One is located in VCU 243 (Sitkoh Bay); applied 5/25/60 under authority of the Alaska Native Allotment Act of 1906; occupancy since 5/1/24.

Mining Claims

According to the BLM, there are currently no mining claims in the Project Area. All prior claims within the study area have been closed by BLM without conveyance.

Withdrawals And Permits

Withdrawals for Lighthouses

There are two lighthouse reserves in the Project Area:

1) McClellan Rock Lighthouse Reserve, located in VCU 245; .10 acres withdrawn indefinitely on 2-13-21 under authority of EO 3406.

2) Point Craven Lighthouse Reserve, located in VCU 245; .50 acres withdrawn indefinitely on 2/13/21 under authority of EO 3406.

Tideland Permits

There are nine tideland permits in the Project Area:

1) Corner Bay, located in VCU 236; 96.30 acre State Easement Grant was issued to the USDA Forest Service on 7/26/83 authorizing construction and maintenance of a Log Transfer Facility (LTF); it expires 7/25/2008. Corresponding DOA Corps Engineers Permit was issued to the U.S. Forest Service on 2/2/81 with no expiration date. Facility has been constructed. Corresponding EPA NPDES Permit issued to the Forest Service on 10/7/88; expires 10/6/92. On 03/05/92, the Forest Service requested renewal of this permit.

2) Crab Bay, located in VCU 233; 194.95 acre State Easement Grant was issued to the USDA Forest Service on 5/1/85 authorizing construction and maintenance of an LTF; it expires 4/30/2000. Corresponding DOA Corps Engineers Permit is issued to Alaska Lumber and Pulp Company, Inc. on 12/21/76; modified on 5/2/78 and 9/18/78 to authorize addition of a boat dock and walkway; no expiration date. Facility has been constructed.

3) False Island, located in VCU 245; 15.6 acre State Easement Grant was issued to the USDA Forest Service on 5/26/88 authorizing construction and maintenance of an LTF; it expires 5/25/98. Corresponding DOA Corps Engineers Permit issued to Alaska Lumber and Pulp Company, Inc. on 2/8/66; transferred to the Forest Service on 3/17/89; no expiration date. Facility has been constructed.

4) Inbetween Creek, located in VCU 230; 104.35 acre State Easement Grant was issued to the USDA Forest Service on 3/18/85 authorizing construction and maintenance of an LTF; it expires 3/17/2000. Corresponding DOA Corps Engineers Permit issued to Alaska Lumber and Pulp Company, Inc. on 7/11/79 with no expiration date. However, if not constructed by 7/11/86, authorization expires. A temporary structure was constructed for beach bundle lift off. It has been removed and the site restored.

5) Lindenberg Harbor (Todd), located in VCU 245; 33.6 acre State Easement Grant was issued to the USDA Forest Service on 7/26/83 authorizing construction and maintenance of an LTF; it expires 7/25/2008. Corresponding DOA Corps Engineers Permit issued to Alaska Lumber and Pulp Company, Inc. on 8/8/72; transferred to the Forest Service on 12/9/82; no expiration date. Facility has been constructed.

6) Sitkoh Bay (East Side), located in VCU 243; 22.87 acre State Easement Grant was issued to the USDA Forest Service on 5/2/89 authorizing construction and maintenance of an LTF; it expired on 5/1/90. Corresponding DOA Corps Engineers Permit issued to Alaska Lumber and Pulp Company, Inc. on 11/22/74; transferred to the Forest Service on 12/20/82; no expiration date. Facility has been constructed.

7) Sitkoh Bay (West Side), located in VCU 243; State Tideland Permit was issued on 12/31/77; it expired on 12/30/78. Corresponding DOA Corps Engineers Permit issued to Alaska Lumber and Pulp Company on 12/10/75; transferred to the Forest Service on 12/28/82. Facility has been constructed.

8) Trap Bay, located in VCU 237; 78.98 acre State Easement Grant was issued to the USDA Forest Service on 1/17/83 authorizing construction and maintenance of an LTF; expires 1/16/2013. Corresponding DOA Corps Engineers Permit issued to the U.S. Forest Service on 2/12/82 with an expiration date of 2/12/91.

9) Oly Creek, located in VCU 245 on Chichagof Island on the north side of Peril Strait. This permit was issued by the Forest Service to Alaska Lumber and Pulp Company, Inc. (now Alaska Pulp Corp.) on 4/20/72 as a FSAU (Forest Service Authorized Use) permit and was closed on 6/1/77. Corresponding DOA Corps of Engineers Permit issued to Alaska Lumber and Pulp Company, Inc. on 10/10/72 with no expiration date but with a requirement to construct facilities by 12/31/75. Corps permit authorizes construction and maintenance of an LTF and associated facilities.

Nonrecreation Special Use Permits

There are four nonrecreation special use permits in the Project Area:

1) Chatham Cannery: Special use permit was issued to the Chatham Cannery, Ltd. on 3/16/92 authorizing occupancy and use of a bunkhouse (industrial camp) located east of the Chatham Cannery in VCU 243; expires on 12/31/95.

2) Moore Mountain Electronic Site: Special use permit was issued to Alaska Pulp Corporation on 1/1/92 authorizing occupancy and use of an electronics site located on Moore Mountain in VCU 245; expires 7/31/92. This permit will not be reissued but the use will be authorized under the APC Long-term Timber Sale Contract.

3) Schmitz Cabin: Term special use permit was issued to William J. Schmitz on 4/24/71 authorizing occupancy and use of a hunting cabin (isolated cabin) located at Crab Bay in VCU 232. Expiration date was extended by amendment to 12/31/92.

4) TEMSCO Fueling Facility: Special use permit was issued to TEMSCO Helicopters, Inc. on 3/18/88 authorizing occupancy and use of a helicopter fueling facility (helicopter landing site) located at False Island in VCU 245; expired 12/1/91.

Chapter 4

Environmental Consequences

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter provides the scientific and analytic basis for the comparison of alternatives presented in Chapter 2. It presents the expected effects on the physical, biological, social, and economic environments associated with implementation of the alternatives. All significant or potentially significant environmental consequences are disclosed, including the direct, indirect, and cumulative effects. These effects may have consequences that are both beneficial and detrimental. Effects are quantified where possible, although qualitative discussions are often necessary.

Chapter 4 begins by detailing the environmental consequences of the alternatives by the same categories used in the description of the affected environment in Chapter 3 (i.e., timber, wildlife, economic and social, etc.). Within each category, the direct, indirect, and cumulative effects are disclosed. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. For the purposes of this document, the time period over which the direct effects are expected to occur is 1992 through approximately 2000. Indirect effects are those that occur later in time or are spatially removed from the activity but would be considered significant in the foreseeable future. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

In a Memorandum Order from *Tenakee Springs v. Courtright*, the District Court indicated that "the EIS should consider, to the extent of foreseeability, the cumulative impacts on the natural environment of a steadily expanding network of logging roads and cutting units within a project area." The reasonably foreseeable time frame over which both indirect and cumulative effects are estimated is here interpreted to mean until the end of the APC long-term contract (i.e., the year 2011).

The cumulative effects analysis in this document tiers to the current Tongass Land Management Plan (TLMP) and Amendment (Forest Service 1979a; Forest Service 1986a), and incorporates the Supplement to the Draft Environmental Impact Statement (DEIS) for the TLMP Revision (Forest Service 1991b). As a result, the cumulative effects do not depend entirely on the alternatives presented in this Draft EIS. Rather, they include what may be expected under the direction detailed in the TLMP. The decisions made in the Forest Plan provide long-range direction for management of the Tongass National Forest for the duration of the plan. It is important to remember that National Forest plans are reviewed periodically and revised at least every 10 to 15 years.

The cumulative effects are projected to occur under any of the action alternatives until such time as the TLMP is revised. Decisions made during the revision process can provide for significant changes in management emphasis in any given portion of the National Forest.

The following assumptions were made to assess the reasonably foreseeable effects to the year 2011. These assumptions reflect current management/technology of National Forests and provide a uniform approach to estimating effects of timber harvest and road construction.

- Laws, guidelines, and Best Management Practices (BMPs) for resource protection would be followed. These requirements are expected to be at least as stringent in the future as they are today.

- Timber sale planning would occur in an interdisciplinary fashion.

- All acres of suitable commercial forest land are equally subject to impacts.

- The No-Action Alternatives would represent only a delay in implementing the TLMP and, based on volume projections, foreseeable cumulative effects would begin to occur before 2011.

- Alternative A1—Current Direction was analyzed under the Final Supplements to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods (SEIS). Therefore, for this document, the SEIS is incorporated by reference for the analysis of Alternative A1 and the effects of the remaining SEIS harvest units are included in the basis for the *Affected Environment* in Chapter 3 of this document.

- Future effects on resources from timber harvest and road construction will be similar to impacts projected for current alternatives.

For the purpose of providing information to analyze reasonably foreseeable effects, timber harvest and transportation system activities have been projected through 2011 for the Southeast Chichagof Project Area. The management emphasis of the current TLMP and TLMP Draft Revision for most of the Project Area is for commodity or market resources and their uses. Also, the TLMP Draft Revision schedules future timber harvest in the Southeast Chichagof Project Area in the year 2005. Therefore, future timber management activities were projected for all alternatives, including the No-Action Alternatives. However, specific future harvest units and roads cannot be identified at this time. Harvest units through 2011 would be proposed and analyzed in an interdisciplinary planning effort (such as this one) at the time future projects are proposed.

Tables 4-1 and 4-2 display the projected harvest and transportation activities through 2011 for each alternative. Future activities were projected assuming that the harvest acreage and road miles proposed for future projects would be similar to those proposed with this project (refer to Chapter 2, *Alternatives Considered*).

Chapter 4 concludes with other environmental considerations that must be addressed under the National Environmental Policy Act (NEPA) but do not fall under the categories discussed in Chapter 3. These topics include unavoidable adverse environmental effects, the relationship between short-term uses and the maintenance and enhancement of long-term productivity, the irreversible and irretrievable commitments of resources, possible conflicts between the proposed action and the plans of other jurisdictions, and other environmental considerations.

Table 4-1
Projected Timber Harvest Through the Year 2011 (in acres)

	Alternative					
VCU	A1/A2[1]	B	C	D	E	F
227	225	297	270	297	288	288
228	0	0	0	0	0	0
229	0	0	0	0	0	0
230	525	90	69	453	381	104
231	803	528	551	649	767	1,113
232	627	162	799	509	374	872
233	455	138	140	347	244	268
234	49	0	0	0	0	0
235	0	0	0	0	0	0
236	0	65	0	0	0	0
237	0	0	0	0	0	0
238	338	733	585	733	684	684
239	0	379	0	44	0	0
240	678	897	815	285	601	869
241	61	274	21	113	247	69
242	0	115	0	115	74	74
243	0	154	0	154	64	64
244	0	0	0	0	0	0
245	0	280	0	280	185	185
246	1,268	493	1,529	918	810	736
Total	5,028	4,604	4,778	4,897	4,718	5,326

SOURCE: Kosak and Lilly 1992.

1 Projected harvest through 2011 is the same for these alternatives.

Table 4-2

Projected Transportation System Development Through the Year 2011 (Miles of New Road Construction)

	Alternative					
VCU	A1/A2[1]	B	C	D	E	F
227	8	10	9	9	9	9
228	0	0	0	0	0	0
229	0	0	0	0	0	0
230	9	2	2	4	3	2
231	10	3	7	5	5	8
232	8	1	5	2	3	10
233	2	1	1	2	2	1
234	0	0	0	0	0	0
235	0	0	0	0	0	0
236	0	0	0	0	0	0
237	0	0	0	0	0	0
238	2	2	2	1	2	1
239	0	1	0	0	0	0
240	8	10	10	3	5	8
241	0	4	1	1	2	1
242	0	3	0	2	2	3
243	0	2	0	1	1	0
244	0	0	0	0	0	0
245	0	3	1	2	2	1
246	15	8	18	10	10	4
Total	54	50	56	52	46	48

SOURCE: Kosak and Allio 1992.

1 Projected transportation development through 2011 is the same for these alternatives.

Timber and Other Vegetation

Following are discussions of the direct, indirect, and cumulative impacts on forest vegetation expected to occur in relation to implementation of the Southeast Chichagof Project alternatives. Included are discussions of the forested land harvested, the effects of silvicultural systems and timber logging methods on the productivity of commercial forest land, and the reasonably foreseeable effects of timber harvest through the year 2011. Also included is a discussion of the proportion of Volume Classes 6 and 7 proposed for harvest by alternative.

Direct Effects

Timber Harvested

Alternative B proposes to harvest the most acres (4,191 acres), followed by Alternative D (3,818 acres), Alternative E (3,668 acres), Alternative F (3,304 acres), and Alternative C (3,292 acres). The cumulative percentage of tentatively suitable forest land in the Project Area that would be harvested by the year 2000 varies little between the action alternatives, with a difference of about 1 percent. However, on a VCU basis, there is greater variation between the alternatives. All units proposed for harvest have been determined to be tentatively suitable acres. Regarding the Commercial Forest Land (CFL) and total land acreage harvested by the year 2000, all action alternatives would result in approximately the same cumulative percentage harvested: 16 percent and 8 percent, respectively; again, there is greater variation on a VCU basis

Under Alternative A1 the remaining unlogged SEIS harvest units (642 acres) would be completed. The action alternatives assume the SEIS harvest units are included in past harvests. Alternative A2 proposes no harvest with this project and therefore would not increase the acreage harvested, but is displayed as a baseline to compare the change in cumulative harvested acres with implementation of the action alternatives.

Tables 4-3 through 4-9 summarize the area proposed for harvest in each alternative, showing the cumulative harvest of tentatively suitable forest land, CFL, and total land area by VCU that would be harvested by the expected completion of this project in the year 2000.

Chainsaw operator preparing the first cut to fell a tree.

Table 4-3
Alternative A1—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	SEIS[1] Harvest Remaining	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	0	297	9	6	3
231	326	0	326	7	4	2
232	268	0	268	7	5	2
233	287	0	287	9	6	3
234	526	0	526	22	1	5
235	129	0	129	0	1	<1
236	2,151	0	2,151	32	26	20
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	0	2,084	26	20	12
240	4	0	4	<1	<1	<1
241	784	0	784	23	17	10
242	1,683	92	1,775	30	25	15
243	3,536	550	4,086	31	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	0	42	1	1	<1
Total	19,904	642	20,546	23	13	7

SOURCE: Lilly 1992.

1 Includes harvest included in the Final Supplement to the Environmental Impact Statements for the 198-86 and 1986-90 Operating Periods.

Table 4-4
Alternative A2—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000): Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	0	297	9	6	3
231	326	0	326	7	4	2
232	268	0	268	7	5	2
233	287	0	287	9	6	3
234	526	0	526	22	15	9
235	129	0	129	0	1	<1
236	2,151	0	2,151	32	26	20
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	0	2,084	26	20	12
240	4	0	4	<1	<1	<1
241	784	0	784	23	17	10
242	1,683	0	1,683	28	22	15
243	3,536	0	3,536	27	21	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	0	42	1	1	<1
Total	19,904	0	19,904	22	13	7

SOURCE: Lilly 1992.

Table 4-5

Alternative B—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	726	1,023	29	21	11
231	326	589	915	19	12	5
232	268	754	1,022	27	18	9
233	287	563	850	27	17	8
234	526	483	1,009	43	28	17
235	129	0	129	0	1	<1
236	2,151	0	2,151	32	26	20
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	0	2,084	26	20	12
240	4	0	4	<1	<1	<1
241	784	0	784	23	17	10
242	1,775	0	1,775	29	25	15
243	4,086	0	4,086	30	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	1,076	1,118	21	14	6
Total	20,546	4,191	24,737	27	15	9

SOURCE: Lilly 1992.

Table 4-6
Alternative C—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	—Percent Cumulative Harvest— (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	653	950	27	20	10
231	326	443	769	16	10	4
232	268	3	271	7	5	2
233	287	473	760	24	15	8
234	526	480	1,006	43	28	17
235	129	0	129	0	1	<1
236	2,151	339	2,490	37	31	23
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	719	2,830	36	27	17
240	4	0	4	<1	<1	<1
241	784	182	966	28	21	13
242	1,775	0	1,775	29	25	15
243	4,086	0	4,086	30	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	0	42	1	1	<1
Total	20,546	3,292	23,838	26	15	8

SOURCE: Lilly 1992.

Table 4-7
Alternative D—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	305	602	17	12	6
231	326	464	790	17	10	4
232	268	365	633	17	11	6
233	287	322	609	19	12	6
234	526	276	802	34	22	14
235	129	0	129	0	1	<1
236	2,151	251	2,402	35	30	22
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	451	2,535	32	24	15
240	4	542	546	20	11	6
241	784	196	980	28	21	13
242	1,775	0	1,775	29	25	15
243	4,086	0	4,086	30	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	646	688	13	8	4
Total	20,546	3,818	24,364	27	16	8

SOURCE: Lilly 1992.

Table 4-8
Alternative E—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	350	647	19	13	7
231	326	310	636	13	8	3
232	268	473	741	20	13	7
233	287	408	695	22	14	7
234	526	252	778	33	22	13
235	129	0	129	0	1	<1
236	2,151	339	2,490	37	31	23
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	614	2,698	34	26	16
240	4	217	221	8	4	2
241q	784	0	784	23	17	10
242	1,775	0	1,775	29	25	15
243	4,086	0	4,086	30	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	705	747	14	9	4
Total	20,546	3,668	24,214	27	16	8

SOURCE: Lilly 1992.

Table 4-9

Alternative F—Forested Land Harvested (in acres)

VCU	Past Harvest (1992)	Proposed Harvest	Total Harvest (2000)	Percent Cumulative Harvest (by the year 2000) Tentatively Suitable	CFL	Land Area
227	0	0	0	0	0	0
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	674	971	28	20	10
231	326	0	326	7	4	2
232	268	0	268	7	5	2
233	287	381	668	21	13	7
234	526	391	917	39	25	16
235	129	0	129	0	1	<1
236	2,151	339	2,490	37	31	23
237	0	0	0	0	0	0
238	1,098	0	1,098	18	21	11
239	2,084	586	2,670	34	25	16
240	4	0	4	<1	<1	<1
241	784	156	940	27	20	12
242	1,775	0	1,775	29	25	15
243	4,086	0	4,086	30	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	777	819	16	10	5
Total	20,546	3,340	23,850	26	15	8

SOURCE: Lilly 1992.

Proposed Harvest by Site Class

Tables 4-10 through 4-14 display the acres of proposed harvest by site class and by alternative. Only those VCUs in which actions are proposed in one or another of the alternatives are displayed in the tables. Because Alternatives A1 and A2 propose no timber harvest for this project, they are not displayed.

Table 4-10
Alternative B—Acres of Proposed Harvest (by Site Class)

VCU	Site Class Low	Site Class Medium	Site Class High	VCU Total
230	349	278	99	726
231	337	176	76	589
232	186	506	62	754
233	204	325	34	563
234	122	320	41	483
236	0	0	0	0
239	0	0	0	0
240	0	0	0	0
241	0	0	0	0
246	575	368	133	1,076
Totals	1,773	1,973	445	4,191
Percent of Acres Harvested	42	47	11	100

SOURCE: Lilly 1992.

Spring board used to assist in the felling of trees.

Table 4-11
Alternative C—Acres of Proposed Harvest (by Site Class)

VCU	Site Class Low	Site Class Medium	Site Class High	VCU Total
230	291	263	99	653
231	329	82	32	443
232	2	0	1	3
233	231	210	32	473
234	121	318	41	480
236	15	323	1	339
239	383	295	41	719
240	0	0	0	0
241	28	83	71	182
246	0	0	0	0
Totals	1,399	1,574	318	3,292
Percent of Acres Harvested	42	48	10	100

SOURCE: Lilly 1992.

Table 4-12
Alternative D—Acres of Proposed Harvest (by Site Class)

VCU	Site Class Low	Site Class Medium	Site Class High	VCU Total
230	154	133	18	305
231	364	68	32	464
232	53	301	11	365
233	144	174	4	322
234	54	214	8	276
236	26	225	0	251
239	238	196	17	451
240	153	327	62	542
241	35	100	61	196
246	348	221	77	646
Totals	1,569	1,959	290	3,818
Percent of Acres Harvested	41	51	8	100

SOURCE: Lilly 1992

Table 4-13
Alternative E—Acres of Proposed Harvest (by Site Class)

VCU	Site Class: Low	Site Class: Medium	Site Class: High	VCU Total
230	193	120	37	350
231	159	75	76	310
232	102	363	8	473
233	91	285	32	408
234	80	131	41	252
236	25	313	1	339
239	308	277	29	614
240	44	146	27	217
241	0	0	0	0
246	366	303	36	705
Totals	1,368	2,013	3,668	3,668
Percent of Acres Harvested	37	55	8	100

SOURCE: Lilly 1992.

Table 4-14
Alternative F—Acres of Proposed Harvest (by Site Class)

VCU	Site Class: Low	Site Class: Medium	Site Class: High	VCU Total
230	334	241	99	674
231	0	0	0	0
232	0	0	0	0
233	85	264	32	381
234	99	251	41	391
236	15	323	1	339
239	304	265	17	586
240	0	0	0	0
241	24	71	61	156
246	421	276	80	777
Totals	1,282	1,691	331	3,304
Percent of Acres Harvested	39	51	10	100

SOURCE: Lilly 1992.

All the action alternatives propose to bring similar proportions of low, medium, and high site class land under management. The alternatives range in their harvest of low site class land from 37 to 42 percent with Alternative E affecting the least (1,282 acres) and Alternative B affecting the most (1,773 acres). A range of 47 to 55 percent of medium site class land would be harvested with Alternative C affecting the least (1,574 acres) and Alternative E affecting the most (2,013 acres). Finally, for the action alternatives, a range of 8 to 11 percent of high site class land would be harvested with Alternative E affecting the least (287 acres) and Alternative B affecting the most (445 acres). Since Alternatives A1 and A2 propose no timber harvest with this project, they provide no opportunity to bring any low, medium, or high sites under active timber management.

Harvest by Stratum

Tables 4-15 through 4-19 display the distribution of acres proposed for harvest in each action alternative by stratum. Only those VCUs in which actions are proposed with each alternative are displayed in the tables. Because Alternatives A1 and A2 propose no timber harvest with this project, they are not displayed.

Table 4-15
Alternative B—Distribution of Acres Proposed for Harvest (by Stratum)

	Stratum A		Stratum B		Stratum C		Stratum D	
VCU	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
230	673	93	49	7	4	<1	0	0
231	365	62	190	32	30	5	4	1
232	538	71	197	26	19	3	0	0
233	422	75	141	25	0	0	0	0
234	377	104	104	22	2	<1	0	0
246	768	71	308	29	0	0	0	0
Total	3,143	75	989	24	55	1	4	<1

SOURCE: Lilly 1992.

Table 4-16
Alternative C—Distribution of Acres Proposed for Harvest (by Stratum)

	Stratum A		Stratum B		Stratum C		Stratum D	
VCU	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
230	600	92	49	8	4	<1	0	0
231	291	66	118	26	30	7	4	1
232	3	100	0	0	0	0	0	0
233	423	90	50	10	0	0	0	0
234	374	78	104	22	2	<1	0	0
236	35	10	304	90	0	0	0	0
239	222	31	495	69	2	<1	0	0
241	85	47	73	40	24	13	0	0
Total	2,033	62	1,193	36	62	2	4	<1

SOURCE: Lilly 1992.

Table 4-17
Alternative D—Distribution of Acres Proposed for Harvest (by Stratum)

	Stratum A		Stratum B		Stratum C		Stratum D	
VCU	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
230	304	100	1	<1	0	0	0	0
231	298	64	132	28	30	7	4	1
232	283	78	73	20	9	2	0	0
233	310	96	12	4	0	0	0	0
234	208	75	66	24	2	1	0	0
236	21	8	230	92	0	0	0	0
239	122	27	329	73	0	0	0	0
240	333	62	208	38	1	<1	0	0
241	86	44	73	37	37	19	0	0
246	498	77	148	23	0	0	0	0
Total	2,463	65	1,272	33	79	2	4	<1

SOURCE: Lilly 1992.

Table 4-18
Alternative E—Distribution of Acres Proposed for Harvest (by Stratum)

	Stratum A		Stratum B		Stratum C		Stratum D	
VCU	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
230	296	85	50	14	4	1	0	0
231	128	41	149	48	30	10	3	1
232	337	71	123	26	13	3	0	0
233	288	71	120	29	0	0	0	0
234	170	67	82	33	0	0	0	0
236	35	10	304	90	0	0	0	0
239	189	31	413	67	12	2	0	0
240	126	58	91	42	0	0	0	0
246	585	83	120	17	0	0	0	0
Total	2,154	59	1,452	40	59	1	3	<1

SOURCE: Lilly 1992.

Table 4-19
Alternative F—Distribution of Acres Proposed for Harvest (by Stratum)

	Stratum A		Stratum B		Stratum C		Stratum D	
VCU	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
230	621	92	49	7	4	1	0	0
233	276	72	105	28	0	0	0	0
234	306	78	83	21	2	1	0	0
236	35	10	304	90	0	0	0	0
239	172	30	413	70	1	<1	0	0
241	83	53	73	47	0	0	0	0
246	627	81	150	19	0	0	0	0
Total	2,120	64	1,177	36	7	<1	0	0

SOURCE: Lilly 1992.

Action alternatives propose from 59 to 75 percent of their harvest from Stratum A, 24 to 40 percent harvest from Stratum B, <1 to 2 percent from Stratum C, and a negligible amount from Stratum D (less than 1 percent or none at all). There is a direct relationship between stratum harvested and where harvest units are dispersed or concentrated in the Project Area. An alternative that focuses harvest in the west side of the Project Area (VCUs 230 to 234 and 246 which is characterized by lower volume stands) harvests more from Stratum A (e.g., Alternative B). The remaining action alternatives that propose more harvest on the east side of the Project Area (VCUs 236, 239, 240, and 241), which is generally characterized by higher volume stands, harvest more from Strata B and C.

Silvicultural Systems

Clearcutting, an even-aged silvicultural system, is considered the optimum silvicultural system for hemlock-spruce forests and is the primary silvicultural system applied in the Southeast Chichagof Project Area. In Southeast Alaska, experience has demonstrated that clearcutting leads to adequate natural regeneration, is economical, and is appropriate for old-growth stands with large and often defective timber. Clearcutting allows more solar radiation to reach the forest floor and thus increases biological decomposition of heavy organic accumulations, which improves the productivity of the site (Ruth and Harris 1979). Clearcutting disturbs less area for a given amount of timber removed than does partial cutting. It is the most effective means known for controlling dwarf mistletoe (a disease which causes growth loss and is common to the hemlock-spruce forests of the Tongass National Forest). Clearcutting also generally ensures a higher percentage of Sitka spruce regeneration, a desirable timber species that is less shade tolerant than hemlock (Harris and Farr 1974). Also, where shallow-rooted tree species, shallow soils, and exposure to the effects of severe weather conditions contribute to windthrow, clearcutting is an effective silvicultural system. These factors have been observed to be major contributors for windthrow where selection and shelterwood harvest systems have been attempted (Harris 1989) and are common in the Southeast Chichagof Project Area.

Clearcutting is the primary silvicultural system used in the Southeast Chichagof Project Area.

However, clearcutting is not the only silvicultural system being proposed for the Southeast Chichagof Project. In line with the philosophy of New Perspectives/Ecosystem Management, opportunities have been identified to harvest a portion of the standing timber in entire units or portions of clearcut units. The effects and success of the partial removal of timber and the retention of regeneration, individual trees, and/or groups of trees are dependent upon the site-specific harvest prescription, logging plan, and execution of the partial harvest operation. Careful preparation of the harvest unit and the definition of feasible, clearly defined objectives for the identification and protection of the trees or groups of trees to be left is essential. Field layout of these units will thus be more involved and more costly than typical clearcut harvest unit preparation. Regeneration would be managed as even-aged stands as they grow around and with the trees that are left. Logging systems must be selected that are feasible for the unit's configuration (volume of timber to be removed, topography, road and landing location, yarding distance, and resource protection requirements) and are capable of providing control of logs during the yarding process to minimize damage to residual trees. Timber harvest involving partial removal and the protection of residual trees requires more time, effort, and care by the logging operator; as a result, logging costs can be 20 to 50 percent higher. Subsequently, sale administration personnel must understand the harvest objectives and work closely with the logger to achieve the end results.

Table 4-20 displays the approximate acreage of identified partial removal opportunities for this project by VCU and alternative. Alternatives A1 and A2 are not displayed as they propose no harvest for this project. Clearcutting is the only silvicultural system applied for the SEIS-related units in Alternative A2. Refer to Appendix C, Unit Design Cards, for a specific description of the silvicultural system recommended for each harvest unit.

Table 4-20

Partial Tree Removal Opportunities Identified for the Southeast Chichagof Project (in acres)

	Alternative				
VCU	B	C	D	E	F
230	7	7	0	7	7
231	49	24	24	24	0
232	9	0	0	9	0
233	88	41	43	75	88
234	55	55	0	0	55
240	0	0	144	0	0
246	17	0	7	7	7
Total	225	127	218	122	157

SOURCE: Lilly 1992.

The effects of partial removal of the standing timber on the site would be similar to the effects described in the following logging systems discussion. However, there would be the added benefit of leaving more relatively undisturbed vegetation on the site, getting a head start on regeneration of the site, providing for age and size diversity in the harvested area, and leaving younger, vigorously growing trees.

Logging Systems

Yarding is the process of conveying logs from the stump to a landing. This can be done using ground-based equipment, cable logging systems, or helicopters. The method used depends upon many factors including access, topography, slope, and resource protection needs.

Shovel logging is one form of logging in the Tongass National Forest.

The moist, soft soils and steep slopes in the Southeast Chichagof Project Area are difficult for operation of ground-based equipment (e.g., track or rubber-tired skidders), and except for shovel logging with track-mounted log loaders, there has been little opportunity for use of this type of equipment. Shovel logging is the process of moving logs with the boom of a hydraulic log loader. The objective is to use the swing boom motion of the loader to swing logs into windrows, then swing the windrows to new locations, and ultimately to a road or landing. Shovel yarding is generally limited to slopes of less than 20 percent. Portions of proposed harvest units that are proposed for cable yarding may be suited for shovel yarding. Considering topographic and soils parameters, this distinction would be made at the time of harvest unit layout. Thus, acreages of shovel yarding displayed may be less than the amount actually performed at implementation.

The effect of shovel logging is compaction of the soil under the track system and loss of flotation, resulting in the machine sinking into the soil. The impact on the soil depends on the soil type and moisture condition of the soil. There is a greater chance that shovel logging will have adverse effects in poorly drained soils with organic parent material. However, shovel logging will affect the soil less than cable methods in cases where the cable system is prone to rutting by log passage. Since by shovel logging, logs are lifted slowly, picked up, and laid down again, no rutting occurs. Where the machine moves over slash or deep organic accumulations, compaction may not be a factor.

Cable logging systems used include highlead, slackline, and skyline systems. Highlead, slackline, and running skyline systems can be used to yard logs both up and down hill. Live skyline (flyer) systems are used for uphill yarding only. Logs yarded by highlead systems are generally dragged on the ground. Some lift to one end of the log is provided by the 90-foot towers commonly used with this method. Where highlead is done uphill, the drag corridors radiate down and away from the landing. Water moving down the slope is dispersed into the cut unit. Where highlead is done down slope, water tends to congregate as drag corridors converge at the landings. Slackline and skyline systems are capable of lifting one end of the log or completely suspending the log. The impact of log movement with these systems is much reduced when compared to highlead. Convergence or divergence of drag corridors, as discussed with the highlead system, are similar with the slackline and skyline skid corridors. In downhill yarding situations where the average yarding distance is less than 500 feet, running skyline systems may be used in place of highlead systems.

Helicopter yarding is relatively new to the Chatham Area. Logs are lifted off the ground and flown to landings. This yarding system causes the least amount of impact to the soil but has the highest yarding cost.

All of the above systems are capable of clearcut harvest, provided harvest unit design and resource protection requirements are not limiting factors. However, for partial removal of the standing timber in a harvest unit with the objective of retaining regeneration, individual trees, or groups of trees, running skyline, live skyline, or helicopter systems are preferred. These systems afford the necessary lift and control of the logs during yarding to prevent damage to residual trees.

Table 4-21 shows a comparison of proposed harvest system acreages for the action alternatives. Alternatives A1 and A2 are not included as they propose no harvest for this project.

Table 4-21
Comparison of Proposed Harvest Systems

	Alternative									
	B		C		D		E		F	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Shovel	78	2	16	<1	73	2	22	1	0	0
Highlead	202	6	156	5	217	6	192	5	91	3
Slackline	1,064	25	604	18	736	19	642	17	608	18
Running Skyline	2,387	57	1,143	35	1,712	45	1,672	46	1,445	44
Live Skyline	409	10	315	10	378	10	187	5	235	7
Helicopter	0	0	1,058	32	702	18	953	26	925	28
Total	4,191	100	3,292	100	3,818	100	3,668	100	3,304	100

SOURCE: Lilly 1992.

Helicopter logging costs more than other systems but causes the least impact to soils.

The distribution of proposed harvest systems varies for the action alternatives. Comparatively, skyline systems (slackline, running skyline, and live skyline) are proposed for 63 to 92 percent of the acres proposed for harvest; Alternative C proposes the least and Alternative B proposes the most skyline yarding. Running skyline is the dominant yarding method for all action alternatives. Highlead yarding systems are proposed for 3 to 6 percent of the harvest acres; Alternative F proposes the least and Alternative B and D proposes the most highlead yarding. Zero to 32 percent of the acres are proposed for helicopter yarding with Alternative B proposing no helicopter yarding and Alternative C proposing the highest proportion of helicopter yarding. In all action alternatives, shovel yarding is proposed for 2 percent or less of the proportion of acres proposed for harvest. The remaining 642 acres of SEIS harvest in Alternative A1 were all proposed for highlead yarding systems.

Proportion of Volume Classes 6 and 7 Proposed for Harvest

The Tongass Timber Reform Act of 1990 (TTRA) modified the long-term timber sale contract to:

> Eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in Volume Classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area.

USDA FSH 2409.18 Region 10 Supplement No. 2409.18-92-5, contains the procedure to follow in determining the proportionality requirements of the TTRA. The objective of this proportionality requirement is to ensure that for each TLMP Management Area (MA), the proportion of old-growth Volume Classes 6 and 7, as compared to the total old-growth in the timber base, is the same after the long-term contract expires as it was when the TTRA was enacted, November 28, 1990. Volume Classes 6 and 7, as defined in the TLMP, refers to volume strata with net inventory volume averaging more than 30,000 board feet per acre.

The basis for proportionality analysis is the updated timber type map (TIMTYP) in the Forest's GIS. TIMTYP is the timber resource base used for the TLMP revision and has been updated for harvest through November 28, 1990. This was the date the TTRA was signed into law and is the basis for calculating proportionality. All wilderness, TTRA designated LUD II areas, and Class I and applicable Class II stream buffer zones have been excluded from the updated TIMTYP base for assessment of proportionality. Timber harvest areas that are planned or harvested can be entered into GIS and combined with the updated TIMTYP layer to electronically calculate proportionality. However, the proportionality requirement of TTRA is specific to volume harvested, not volume planned or scheduled for harvest. The final determination of proportionality will be made based on the actual location of the designated harvest units.

There are six MAs in the Southeast Chichagof Project Area. MA C29 consists of VCUs 202 and 222 to 227; VCU 227 is the only VCU within this MA that is in the Project Area. MA C33 consists of VCUs 228 and 229. MA C34 consists of VCUs 230 to 234 and 246. MA C36 consists of VCU 235. MA C37 consists of VCUs 236 and 238 to 245. MA C37a consists of VCU 237.

MA C33 was designated a LUD II (limits timber harvest) in the TLMP, and MAs C36 and C37a were legislatively designated as LUD II in the TTRA. The area within MAs C33, C36, and C37a were excluded from the updated land base which is used to assess proportionality. Also, there is no timber harvest proposed in MA C29 for this project. Therefore, these MAs will not be considered further in this discussion of proportionality.

Within MA C37, at the time the current land base was updated, SEIS-related harvest was in progress. As a result, the updated current land base upon which proportionality is to be determined includes a portion, but not all, of the SEIS harvest units. SEIS harvest in MA C37 that occurred after November 28, 1990 or is scheduled to occur is therefore included in this projection of proportionality for the Southeast Chichagof Project.

Tables 4-22 and 4-23 display the proportionality for MAs C34 and C37 for the alternatives. Since Alternatives A1 and A2 propose no timber harvest, they are represented by the current land base acres and proportionality in MA C34. Each table shows the current land base distribution of volume classes and proportionality as of November 28, 1990, and harvest projections based on the GIS TIMTYP layer.

Table 4-22
TTRA Proportionality for Management Area C34

	Total Timber Base (acres)	Volume Classes 4 and 5 (acres)	Volume Classes 6 and 7 (acres)	Proportionality[1] (percent)
Current Land Base (Alternatives A1 and A2)	31,668	30,702	966	3.05
Proposed for Harvest-Alt. B	-4,191	-4,132	-59	
Projected Proportionality	27,477	26,570	907	3.30
Proposed for Harvest-Alt. C	-2,052	-2,011	-40	
Projected Proportionality	29,616	28,691	926	3.13
Proposed for Harvest-Alt. D	-2,378	-2,333	-45	
Projected Proportionality	29,290	28,369	921	3.14
Proposed for Harvest-Alt. E	-2,498	-2,447	-50	
Projected Proportionality	29,170	28,255	916	3.14
Proposed for Harvest-Alt. F	-2,223	-2,217	-6	
Projected Proportionality	29,445	28,485	960	3.26

SOURCE: Lilly 1992.
1 Proportionality = Volume Classes 6-7 (acres) / Total Timber Base (acres) * 100

Table 4-23
TTRA Proportionality for Management Area C37

	Total Timber Base (acres)	Volume Classes 4 and 5 (acres)	Volume Classes 6 and 7 (acres)	Proportionality[1] (percent)
Current Land Base	62,894	59,315	3,579	5.69
SEIS Harvest Remaining-Alt. A2	-2,125	-1,923	-202	
Projected Proportionality	60,769	57,392	3,377	5.56
SEIS Harvest Remaining-Alt. A1	-642	-642	0	
Projected Proportionality	60,127	56,750	3,377	5.62
Proposed for Harvest-Alt. B	0	0	0	
Projected Proportionality	60,127	56,750	3,377	5.62
Proposed for Harvest-Alt. C	-1,240	-1,214	-26	
Projected Proportionality	58,887	55,536	3,351	5.69
Proposed for Harvest-Alt. D	-1,440	1,402	-38	
Projected Proportionality	58,687	55,348	3,339	5.69
Proposed for Harvest-Alt. E	-1,170	-1,158	-12	
Projected Proportionality	58,957	55,592	3,365	5.71
Proposed for Harvest-Alt. F	-1,081	-1,080	-1	
Projected Proportionality	59,046	55,670	3,376	5.72

SOURCE: Lilly 1992.

1 Proportionality = Volume Classes 6-7 (acres) / Total Timber Base (acres) * 100

All action alternatives are projected to result in proportionality consistent with the requirements of the TTRA for MA C34. There is projected to be a greater proportion of Volume Classes 6 and 7 remaining in C34 after implementation of any of the alternatives.

Alternatives C, D, E, and F are also projected to result in proportionality consistent with the requirements of the TTRA in MA C37. Alternative B is projected to result in a proportionality which would not yet meet the requirements of the TTRA at the time the proposed activities would be completed for MA C37. However, all of the proposed harvest under Alternative B would be located in MA C34.

Alternatives A1 and A2 (and B) are projected to result in proportionality that would not yet meet the requirements of the TTRA at the time the SEIS activity is completed. Earlier projections of proportionality under the analysis associated with the Addendum to the November 17, 1989 Record of Decision (ROD) for the SEIS that projected the remaining SEIS harvest would meet the proportionality requirement were performed prior to the issuance of the Supplement to the Forest Service Handbook (January 15, 1992) that established the procedure to determine proportionality. However, the departure is within 0.5 percent of the current land base proportionality for both Alternatives A1 and A2, 0.13 and 0.07 percent, respectively. As demonstrated with Alternatives C, D, E, and F, and the projections of future harvest through 2011, sufficient volume remains to provide for scheduling of future long-term contract offerings. The volume remaining in MA C37 would meet planned direction for a feasible offering and would meet the standard for proportionality now with this action and later at the end of the long-term contract term. The action alternatives that propose activities in C37 demonstrate that prior harvest under SEIS and continued development with Southeast Chichagof would provide access to a greater proportion of lower volume classes, which makes the lower volumes more feasible for future offerings.

It should be noted that the estimates of sawlog and utility volume for the Southeast Chichagof Project are based upon site-specific data gathered in the proposed harvest areas and from recent timber cruise information for SEIS offering areas within the Project Area. Economic analysis and mid-market assessment (displayed later in this chapter) were performed using these volumes and these are the volumes that appear on the Unit Design Cards in Appendix C. TIMTYP volume assumptions were not used in the final analysis for this project.

Harvest by Plant Series

Timber harvest activities would affect forested plant communities but would have little or no effect on nonforest plant communities, with the exception of road segments which may cross nonforested areas. The short-term effect on vegetation in the Southeast Chichagof Project Area (resulting from timber harvest activity) would be the conversion of climax forest stands into younger, faster-growing stands. The removal of the forest overstory would change the microsite conditions that had influenced the species composition and density of the understory vegetation. Species that thrive best in the shaded and protected environment under the mature forest (such as some mosses, lichens, herbs, and shrubs) would find themselves without the beneficial influence of the trees and would be reduced in vigor or competitive ability. Some species survive in the understory but, when released from the influence of the forest, become vigorous competitors for growth space. Examples of such species include huckleberries, salmonberry, and western hemlock trees. Other species are not notable in the forest understory (such as Sitka spruce) but are able to develop rapidly in open conditions from seed.

Tables 4-24 through 4-28 show the acres of proposed harvest for each major plant series found in the Southeast Chichagof Project Area, by alternative. Only those VCUs in which timber harvest is proposed with one or another of the alternatives are displayed. Because Alternatives A1 and A2 do not propose any harvest for this project, they are not displayed. Refer to the *Timber and Other Vegetation* section of Chapter 3 for a description of these plant series.

Table 4-24
Alternative B—Proposed Harvest (by Major Plant Series)

VCU	Sitka Spruce (acres)	Western Hemlock (acres)	Mountain Hemlock (acres)	Mixed Conifer (acres)	Total (acres)
230	18	493	6	209	726
231	39	433	0	117	589
232	13	595	0	146	754
233	3	454	0	106	563
234	2	374	0	107	483
236	0	0	0	0	0
239	0	0	0	0	0
240	0	0	0	0	0
241	0	0	0	0	0
246	96	752	60	168	1,076
Total	171	3,101	66	853	4,191
Percent of Acres Harvested	4	74	2	20	100

SOURCE: Lilly 1992.

Table 4-25
Alternative C—Proposed Harvest (by Major Plant Series)

VCU	Sitka Spruce (acres)	Western Hemlock (acres)	Mountain Hemlock (acres)	Mixed Conifer (acres)	Total (acres)
230	18	439	6	190	653
231	31	311	0	101	443
232	0	3	0	0	3
233	1	327	0	145	473
234	2	371	0	107	480
236	1	316	0	22	339
239	16	637	41	28	719
240	0	0	0	0	0
241	0	180	0	2	182
246	0	0	0	0	0
Total	69	2,581	47	595	3,292
Percent of Acres Harvested	2	78	2	18	100

SOURCE: Lilly 1992.

Table 4-26
Alternative D—Proposed Harvest (by Major Plant Series)

VCU	Sitka Spruce (acres)	Western Hemlock (acres)	Mountain Hemlock (acres)	Mixed Conifer (acres)	Total (acres)
230	18	153	6	128	305
231	31	334	0	99	464
232	10	268	0	87	365
233	3	216	0	103	322
234	2	226	0	48	276
236	0	251	0	0	251
239	3	409	13	26	451
240	13	411	0	118	542
241	21	173	0	2	196
246	45	482	23	96	646
Total	146	2,923	42	707	3,818
Percent of Acres Harvested	4	77	1	18	100

SOURCE: Lilly 1992.

Table 4-27
Alternative E—Proposed Harvest (by Major Plant Series)

VCU	Sitka Spruce (acres)	Western Hemlock (acres)	Mountain Hemlock (acres)	Mixed Conifer (acres)	Total (acres)
230	0	273	1	76	350
231	39	207	0	64	310
232	2	388	0	83	473
233	2	326	0	80	408
234	0	180	0	72	252
236	1	316	0	22	339
239	16	539	28	31	614
240	0	187	0	30	217
241	0	0	0	0	0
246	29	545	60	71	705
Total	89	2,961	89	529	3,668
Percent of Acres Harvested	2	81	2	15	100

SOURCE: Lilly 1992.

Table 4-28
Alternative F—Proposed Harvest (by Major Plant Series)

VCU	Sitka Spruce (acres)	Western Hemlock (acres)	Mountain Hemlock (acres)	Mixed Conifer (acres)	Total (acres)
230	18	455	6	195	674
231	0	0	0	0	0
232	0	0	0	0	0
233	3	293	0	85	381
234	0	304	0	87	391
236	1	316	0	22	339
239	4	527	28	27	586
240	0	0	0	0	0
241	0	154	0	2	156
246	48	543	60	126	777
Total	95	2,592	94	544	3,304
Percent of Acres Harvested	3	78	3	16	100

SOURCE: Lilly 1992.

Western hemlock is the most widely harvested plant series in all action alternatives, ranging in harvest from 2,581 acres (Alternative C) to 3,101 acres (Alternative B). This is expected as western hemlock is the most widely distributed plant series in the Southeast Chichagof Project Area (Table 3-9, Chapter 3). The harvest of mixed conifer series ranges from 529 acres (Alternative E) to 853 acres (Alternative B), while the harvest of Sitka spruce series ranges from 69 acres (Alternative C) to 171 acres (Alternative B). Mountain hemlock is the least harvested plant series, ranging from 42 acres (Alternative D) to 94 acres (Alternative F).

Of the hemlock plant series, western hemlock would be harvested the most and mountain hemlock the least in all the alternatives.

Threatened and Endangered Plant Species

No plant species known to occur in Southeast Alaska have been listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS). Furthermore, no plant species have been listed as sensitive by the Alaska Region of the Forest Service. Therefore, the proposed actions are not expected to affect threatened, endangered, or sensitive plant species. Four Category 2 candidate plant species may occur in the Project Area (Lindell 1992). For more information, see the Biological Assessment in Appendix F.

Indirect and Cumulative Effects

All of the areas proposed for harvest will be restocked within 5 years, either by natural regeneration or by replanting. Where necessary, precommercial thinning will be done approximately 20 years after harvest. VCUs 230 to 234, 236, 240, 241, and 246 (LUD IV VCUs) will be managed on a 100-year rotation while VCU 239 (LUD III VCU) will be managed on a 120-year rotation. No timber harvest is planned for VCUs 227, 238, and 242 to 245 for this project. However, future timber harvest is scheduled within the Southeast Chichagof Project Area through the year 2011. Following are discussions of long-term impacts on timber productivity, the effects of precommercial thinning, projected timber harvest through the year 2011 (end of the 50-year contract), and plant community successional changes following proposed timber harvest.

Long-term Productivity

The effects of all action alternatives on long-term timber productivity would be the conversion of unmanaged, overmature stands to managed, faster growing, second-growth stands. Overmature stands have lower forest floor temperatures than even-aged stands; thus reducing biological activity. Organic decomposition slows, and as a result, the supply of available nutrients is reduced. With decreased biological activity, less nitrogen is available for tree growth and the trees' nutritional status is lowered. While overmature stands' growth and vigor remain nearly constant, they are at a level below that of even-aged stands (Harris and Farr 1974). Table 4-29 displays average structural characteristics of managed stands by site classification (low, medium, and high).

The magnitude of the effect of converting unmanaged, overmature stands to managed, second-growth stands will vary depending upon the number of acres harvested in each site class (Refer to Tables 4-10 through 4-14 in the *Proposed Harvest by Site Class* discussion in this section). Alternative B converts the most acres to a managed condition (4,191 acres), followed by Alternative D (3,818 acres), Alternative E (3,668 acres), Alternative F (3,304 acres), and Alternative C (3,292 acres). Alternative A1 and A2 propose no harvest for this project and convert no additional acres to a managed condition.

Table 4-29
Average Structural Characteristics of Managed Stands (by Site Classification)

Stand Age (years)	Height (feet)	DBH[1] (inches)	Volume/Acre[2] (board feet)
Low Site			
5-20	19	1.3	0
20-50	48	5.1	1,800
50-80	74	7.9	8,500
80-100	88	9.6	18,400
100-120	102	11.2	30,100
120-160	122	14.2	49,200
Medium Site			
5-20	18	2.1	0
20-50	59	8.2	3,900
50-80	93	11.7	20,600
80-100	109	13.5	36,900
100-120	121	14.9	50,100
120-160	137	17.5	67,000
High Site			
5-20	21	2.7	0
20-50	72	9.5	7,500
50-80	107	13.2	36,700
80-100	123	15.1	53,800
100-120	134	16.8	64,900
120-160	151	19.7	83,700

SOURCE: Lilly 1992.
1 Diameter at breast height.
2 Net sawlog.

All stands proposed for harvest are mature or overmature and are well beyond the age of maximum average annual growth of the stand. They are representative of uneven-aged western hemlock stands that commonly take hundreds of years to develop under natural conditions (that is, unless they are changed by natural events such as windthrow or manipulated by intensive forest management practices).

The open conditions created in clearcuts allow both Sitka spruce and western hemlock to regenerate rapidly. Even-aged stands are generally comprised of 10 to 75 percent spruce depending on the soil type and the age of the stand. On average, the volume of spruce in even-aged stands 75 to 100 years after harvest is about 50 percent (Taylor 1934) compared to 28 percent in existing mature and overmature stands. With the use of silvicultural practices such as precommercial thinning, an additional 10 percent or more increase in the spruce component is expected.

Although log quality in second-growth stands is expected to be lower than in mature and over-mature stands, even on sites that have been precommercially thinned, total yield per acre is expected to be higher in second-growth stands. The lower quality will be reflected in the log grades (sizes), with second-growth timber stands having fewer higher grade logs than existing mature and over-mature stands. In addition, second-growth stands will have less volume in the larger diameter classes. Nevertheless, total yield will be significantly greater in second-growth stands than in mature and overmature stands. The long-term result of precommercial thinning is the production of more usable fiber. Precommercial thinning also allows the option of reducing the rotation age. This is because merchantable size logs are produced sooner on thinned sites than in areas not thinned.

Most second-growth stands will exhibit less variation in tree diameter and height than the mature and overmature stands they replace. At 100 years of age, average diameters for unmanaged second-growth stands will range from 10 inches on medium sites to 14 inches on high sites. With several precommercial thinnings, it is possible to produce average stand diameters that approximate old-growth averages. In 100 to 110 years, diameters can range from 14 inches on medium sites to more than 15 inches on high sites (Forest Service 1991b).

Precommercial Thinning

Regeneration will restock harvested areas.

Regeneration of naturally disturbed (windthrown) or harvested areas may result in stocking levels of seedling/saplings on many upland sites with an average 4,000 stems per acre. Although these stands may eventually thin naturally, production of usable wood would be hastened if stocking were less dense through the use of precommercial thinning (Harris and Farr 1974). The current TLMP estimates that for every acre precommercially thinned, timber yield increases by approximately 5.4 MBF. Long-term benefits are primarily focused on reducing the competition for sunlight by the plant community. This results in the understory and the remaining conifers growing at accelerated rates for longer time periods than unthinned, second-growth stands. This translates into higher sawlog volume and faster successional change, thus providing climax stand conditions sooner than would be provided by unthinned second-growth stands. It should be recognized that precommercial thinning is performed approximately 20 years after harvest and is dependent upon site, stocking, and other resource needs. Thus, the proposed thinning acreages may change at the time precommercial thinning is performed.

Projected Harvest Through 2011

As timber harvest is scheduled to occur in the Project Area in the future, harvest was projected for all Southeast Chichagof Project alternatives including the No-Action Alternatives. However, this does not foreclose the option of no-action in the future. A no-action projection (as well as greater or lesser harvest) for future harvest could also be estimated for any and all of the alternatives for the Southeast Chichagof Project. In that case, cumulative impacts would be limited to those caused by the Southeast Chichagof Project. Tables 4-30 through 4-35 display projected timber harvest through 2011 by alternative.

Table 4-30
Alternatives A1 and A2—Cumulative Timber Harvest by the Year 2011 (in acres)

Land VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	Percent Cumulative Harvest by Year 2011: Available Tentatively Suitable	CFL	Area
227	0	225	225	25	15	6
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	297	525	822	24	17	9
231	326	803	1,129	24	15	6
232	268	627	895	24	16	8
233	287	455	742	24	15	7
234	526	49	575	24	16	10
235	129	0	129	0	1	<1
236	2,151	0	2,151	32	26	20
237	0	0	0	0	0	0
238	1,098	338	1,436	24	27	15
239	2,084	0	2,084	26	20	12
240	4	678	682	25	14	7
241	784	61	845	24	18	11
242	1,775	0	1,775	30	25	15
243	4,086	0	4,086	31	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	1,268	1,310	25	16	8
Total	20,546	5,028	25,574	28	17	9

SOURCE: Lilly 1992.
Note: The Cumulative Harvest in the year 2000 includes the 642 acres of SEIS-related harvest in Alternative A1.

Table 4-31

Alternative B—Cumulative Timber Harvest by the Year 2011 (in acres)

VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	Percent Cumulative Harvest by Year 2011: Available Tentatively Suitable	CFL	Land Area
227	0	297	297	33	20	8
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	1,023	90	1,113	32	23	12
231	915	528	1,443	30	19	8
232	1,022	162	1,184	31	21	11
233	850	138	988	31	20	10
234	1,009	0	1,009	43	28	17
235	129	0	129	0	1	<1
236	2,151	65	2,216	33	27	20
237	0	0	0	0	0	0
238	1,098	733	1,831	30	34	19
239	2,084	379	2,463	31	23	15
240	4	897	901	33	18	10
241	784	274	1,058	31	23	14
242	1,775	115	1,890	32	26	16
243	4,086	154	4,240	32	25	16
244	2,282	0	2,282	34	31	19
245	4,102	280	4,382	32	27	18
246	1,118	493	1,611	30	20	9
Total	24,737	4,604	29,341	32	19	10

SOURCE: Lilly 1992.
Note: This information derived from Chatham Area GIS database 1992.

Table 4-32
Alternative C—Cumulative Timber Harvest by the Year 2011 (in acres)

VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	Percent Cumulative Harvest by Year 2011: Available Tentatively Suitable	CFL	Land Area
227	0	270	270	30	18	7
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	950	69	1,019	29	21	11
231	769	551	1,320	28	18	7
232	271	799	1,070	28	19	10
233	760	140	900	29	18	9
234	1,006	0	1,006	43	28	17
235	129	0	129	0	1	<1
236	2,490	0	2,490	37	31	23
237	0	0	0	0	0	0
238	1,098	585	1,683	28	32	17
239	2,803	0	2,803	36	27	17
240	4	815	819	30	17	9
241	966	21	987	29	22	13
242	1,775	0	1,775	30	25	15
243	4,086	0	4,086	31	24	15
244	2,282	0	2,282	34	31	19
245	4,102	0	4,102	30	25	17
246	42	1,529	1,571	30	19	9
Total	23,838	4,778	28,616	31	19	10

SOURCE: Lilly 1992.
Note: This information derived from Chatham Area GIS database 1992.

Table 4-33
Alternative D—Cumulative Timber Harvest by the Year 2011 (in acres)

VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	Percent Cumulative Harvest by Year 2011: Available Tentatively Suitable	CFL	Land Area
227	0	297	297	33	20	8
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	602	453	1,055	30	22	11
231	790	649	1,439	30	19	8
232	633	509	1,142	30	21	10
233	609	347	956	30	19	9
234	802	0	802	34	22	14
235	129	0	129	0	1	<1
236	2,402	0	2,402	37	31	23
237	0	0	0	0	0	0
238	1,098	733	1,831	30	34	19
239	2,535	44	2,579	33	25	15
240	546	285	831	30	17	9
241	980	113	1,093	32	24	15
242	1,775	115	1,890	32	26	16
243	4,086	154	4,240	32	25	16
244	2,282	0	2,282	34	31	19
245	4,102	280	4,382	32	27	18
246	688	918	1,606	30	20	9
Total	24,364	4,897	29,261	32	19	10

SOURCE: Lilly 1992.

Table 4-34
Alternative E—Cumulative Timber Harvest by the Year 2011 (in acres)

VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	—Percent Cumulative Harvest by Year 2011— Available Tentatively Suitable	CFL	Land Area
227	0	288	288	32	19	8
228	0	0	0	0	0	0
229	305	0	305	0	4	1
230	647	381	1,028	30	21	11
231	636	767	1,403	30	19	7
232	741	374	1,115	30	20	10
233	695	244	939	30	19	9
234	778	0	778	33	22	13
235	129	0	129	0	1	<1
236	2,490	0	2,490	38	32	24
237	0	0	0	0	0	0
238	1,098	684	1,782	29	34	18
239	2,698	0	2,698	34	26	16
240	221	601	822	30	17	9
241	784	247	1,031	30	22	14
242	1,775	74	1,849	31	26	16
243	4,086	64	4,150	32	25	15
244	2,282	0	2,282	34	31	19
245	4,102	185	4,287	31	27	18
246	747	810	1,557	29	19	9
Total	24,214	4,718	28,956	32	19	10

SOURCE: Lilly 1992.

Table 4-35
Alternative F—Cumulative Timber Harvest by the Year 2011 (in acres)

VCU	Cumulative Harvest in 2000	Projected Harvest 2000-2011	Cumulative Harvest in 2011	—Percent Cumulative Harvest by Year 2011— Available Tentatively Suitable	CFL	Land Area
227	0	288	288	32	19	8
228	0	0	0	0	0	0
229	305	0	305	7	4	1
230	971	104	1,075	31	22	11
231	326	1,113	1,439	30	19	8
232	268	872	1,140	30	21	10
233	668	268	936	30	18	9
234	917	0	917	39	25	16
235	129	0	129	0	1	<1
236	2,490	0	2,490	37	31	23
237	0	0	0	0	0	0
238	1,098	684	1,782	29	34	18
239	2,670	0	2,670	34	25	16
240	4	869	873	32	18	9
241	940	69	1,009	31	23	14
242	1,775	74	1,849	31	26	16
243	4,086	64	4,150	32	25	15
244	2,282	0	2,282	34	31	19
245	4,102	185	4,287	31	27	18
246	819	736	1,555	29	19	9
Total	23,850	5,326	29,176	32	19	10

SOURCE: Lilly 1992.

Although the preceding tables indicate that one alternative would harvest more by 2011 than another, the ranking of the alternatives by acres harvested by 2011 is insignificant. This is because these projections only estimate future harvest. Harvest levels proposed with future projects would probably vary by action and no-action alternatives developed at that time. A no-action alternative in the future would result in cumulative impacts related only to the current Southeast Chichagof Project, represented by the "Cumulative Harvest in 2000" column of the above tables. However, it is notable that projected harvest for all alternatives would result in approximately the same cumulative harvest of available tentatively suitable, CFL, and land area within the Project Area. This can be attributed to the projection of a future harvest level for all alternatives that is essentially the same and that future harvest is projected to occur in VCUs where it may have been avoided with this project. Thus, the cumulative effects of each alternative on the timber resource in the Project Area can be considered nearly the same.

Plant Community Succession

After reforestation, managed forests grow through several distinctive successional stages. The following discussion on successional changes that occur in the forest after harvest generally applies to all units proposed for harvest. Characteristics such as height, diameter, and productivity vary between sites of different quality, and site classes. Refer to Table 4-29 for these differences between site classes. Different components dominate the stand at different stages, and the overall forest structure changes over time. The following describes these successional stages.

Seedling/Sapling Stage

In the first 5 years of the seedling/sapling stage, the young stand receives maximum sunlight, resulting in the rapid establishment of a variety of shrubs, forbs, and grasses. There is little incidence of damage or mortality from disease or infestation at this stage. The changed structure of the young stand affects the structure of adjacent stands; windthrow increases with greater wind exposure, and understory development accelerates because of increased light into the stand (see Glossary for definitions).

After 10 to 15 years, seedlings have taken on the characteristics of an emerging new forest.

In years 5 to 20, seedlings grow into a vigorous new forest with the trees averaging about 19 feet in height and 1 to 3 inches diameter at breast height (DBH). Understory production of woody-stemmed species is at its highest at this stage, especially in blueberry-dominated sites. Larger dead materials from the original stand begin to decompose, and the stand edge stabilizes, resulting in less windthrow. At the end of this successional stage, the stand may be precommercially thinned, leaving a species composition of about 60 percent western hemlock, 40 percent Sitka spruce, and less than 2 percent cedar.

Table 4-36 tracks the cumulative acres in the seedling/sapling stage from the present (1992) to the end of the long-term contract (2011), by alternative. These figures represent the current condition, what is proposed for harvest at this time in each alternative, projected future harvest through 2011, and changes that occur over time as stands grow from one stage to the next.

Table 4-36
Cumulative Acres in Seedling/Sapling Stage

VCU	Acres In 1992	Alternative A1/A2 2000	A1/A2 2011	B 2000	B 2011	C 2000	C 2011	D 2000	D 2011	E 2000	E 2011	F 2000	F 2011
227	0	0	225	0	297	0	270	0	297	0	288	0	288
228	0	0	0	0	0	0	0	0	0	0	0	0	0
229	305	0	0	0	0	0	0	0	0	0	0	0	0
230	249	249	525	975	816	902	722	554	758	599	731	923	778
231	0	0	803	589	1,117	443	994	464	1,113	310	1,077	0	1,113
232	0	0	627	754	916	3	802	365	874	473	847	0	872
233	287	0	455	563	701	473	473	322	669	408	652	381	649
234	526	0	49	483	483	480	480	276	276	252	252	391	391
235	0	0	0	0	0	0	0	0	0	0	0	0	0
236	1,926	771	666	771	731	1,110	1,005	1,022	917	1,110	1,018	1,110	1,005
237	0	0	0	0	0	0	0	0	0	0	0	0	0
238	1,098	1,098	1,436	1,098	1,831	1,098	1,683	1,098	1,831	1,098	1,782	1,098	1,782
239	2,084	779	508	779	887	1,498	1,228	1,230	1,003	1,393	1,122	1,365	1,094
240	4	0	678	0	897	0	815	542	827	217	818	0	869
241	784	0	61	0	274	182	203	196	309	0	247	156	225
242	1,775	371	371	371	486	371	371	371	486	371	445	371	445
243	4,034	842	842	842	996	842	842	842	996	842	906	842	906
244	2,282	0	0	0	0	0	0	0	0	0	0	0	0
245	1,693	0	0	0	280	0	0	0	280	0	185	0	185
246	0	0	1,268	1,076	1,569	0	1,529	646	1,564	705	1,515	777	1,513
Total	17,047	4,110	8,513	8,301	12,280	7,402	11,555	7,928	12,200	7,778	11,871	7,414	12,115

SOURCE: Lilly 1992.

Alternative B projects the highest number of acres in the seedling/sapling stage in 2000 (8,301 acres), followed by Alternative D (7,928 acres), Alternative E (7,778 acres), Alternative F (7,414 acres), and Alternative C (7,402 acres). Alternative A1 and A2 project the lowest number of acres in this successional stage (4,110 acres).

Future harvest through 2011 would add to the acreage in this stage. The actual magnitude of the addition of acres by future harvest to the seedling/sapling stage would be determined at the time future projects are proposed and analyzed. For the future harvest projected for this analysis, by 2011, Alternative D projects the highest number of acres in the seedling/sapling stage (12,200 acres), followed by Alternative B (12,280 acres), Alternative F (12,115 acres), Alternative E (11,871 acres), Alternative C (11,555 acres), and Alternatives A1 and A2 (8,513 acres).

Pole/Young Sawtimber Stage

At a stand age of 20 to 50 years, during the pole/young sawtimber stage, the forest is dense and the canopy is closing. Tree growth is very rapid, with a gain of about one foot in height per year. At age 50, tree heights range from 48 to 72 feet. Diameters range from 5 to 10 inches, depending on the site class. Tree crowns begin to grow closer together, while the understory

changes from a dense shrub-, herb-, and seedling-dominated structure to one of dense moss. Stands which have been precommercially thinned will have a two-layered canopy, with hemlock in the lower story. Canopy closure will occur more slowly in precommercially thinned sites.

At 20 years, a mature forest provides a dense, closed cover.

In years 50 to 80, the stand remains closed. At age 80, tree heights range from 74 to 107 feet and diameters range from 8 to 13 inches, depending on site class. Little sunlight reaches the forest floor, and the understory continues to be dominated by moss. Tree diameter growth slows to about 1 inch every 10 years, as competition between trees increases. It is not currently economically feasible to commercially thin stands at this age, but thinning would increase understory growth and diversity and would also result in greater tree diameter growth.

Table 4-37 tracks the cumulative acres in the pole/young sawtimber stage from the present (1992) to the end of the long-term contract (2011), by alternative. These figures represent the current condition and changes that occur over time as stands grow from one stage to the next.

As proposed harvest would probably not begin until 1993 and is expected to be substantially complete in 2000, none of the acres proposed for harvest at this time would grow into this successional stage by 2011. Likewise, none of the projected harvest through 2011 would have grown into this successional change. The only change that occurs is the growth of some of the existing harvest units into the pole/young sawtimber stage. Thus, all alternatives show (in both 2000 and 2011) the same number of total acres in this successional stage.

Table 4-37
Cumulative Acres in Pole/Young Sawtimber Stage

	Acres	Alternative											
	in	A1/A2		B		C		D		E		F	
VCU	1992	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011
227	0	0	0	0	0	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0	0	0	0	0	0
229	0	305	305	305	305	305	305	305	305	305	305	305	305
230	48	48	297	48	297	48	297	48	297	48	297	48	297
231	326	326	326	326	326	326	326	326	326	326	326	326	326
232	268	268	268	268	268	268	268	268	268	268	268	268	268
233	0	287	287	287	287	287	287	287	287	287	287	287	287
234	0	526	526	526	526	526	526	526	526	526	526	526	526
235	129	129	129	129	129	129	129	129	129	129	129	129	129
236	225	1,380	1,485	1,380	1,485	1,380	1,485	1,380	1,485	1,380	1,485	1,380	1,485
237	0	0	0	0	0	0	0	0	0	0	0	0	0
238	0	0	0	0	0	0	0	0	0	0	0	0	0
239	0	1,305	1,576	1,305	1,576	1,305	1,576	1,305	1,576	1,305	1,576	1,305	1,576
240	0	4	4	4	4	4	4	4	4	4	4	4	4
241	0	784	784	784	784	784	784	784	784	784	784	784	784
242	0	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404	1,404
243	52	3,244	3,244	3,244	3,244	3,244	3,244	3,244	3,244	3,244	3,244	3,244	3,244
244	0	2,282	2,282	2,282	2,282	2,282	2,282	2,282	2,282	2,282	2,282	2,282	2,282
245	2,409	4,102	4,102	4,102	4,102	4,102	4,102	4,102	4,102	4,102	4,102	4,102	4,102
246	42	42	42	42	42	42	42	42	42	42	42	42	42
Total	3,499	16,436	17,601	16,436	17,601	16,436	17,601	16,436	17,601	16,436	17,601	16,436	17,601

SOURCE: Lilly 1992.

Mature, even-aged stand

Mature Sawtimber Stage

In years 80 to 100, the stand enters the mature sawtimber stage. At age 100, tree heights range from 88 to 123 feet and diameters range from 10 to 15 inches, depending on site class. Some trees may die, while others become clearly dominant in size. Diameter growth remains at less than 1 inch every 10 years. Moss continues to dominate the understory except in places where the canopy has opened and allowed sufficient light for herbaceous plants. These structural characteristics continue into the later stages of the stand (100 to 160 years) with continued slow growth and occasional openings in the canopy. Because none of the existing harvest units or proposed harvest units would grow into this successional stage by 2011, no acres are displayed.

Old-growth Stage

In addition to the above stages for managed stands, Alaback (1984) identified an old-growth stage which would pertain to stands managed for old growth or stands which have not been harvested. The stand becomes overmature. Patches of shrubs, tree saplings, and herbs alternate with patches of overmature timber, creating a complex, multi-layered mosaic. The stand declines in growth and vigor and has the highest degree of variation and the most structurally diverse understory of any successional stage. Table 4-38 presents the acres (by alternative) of old-growth that existed prior to the APC long-term timber contract and the acreages of old

growth that are projected to remain at the end of this Project (2000) and at the end of the contract (2011).

Although on a VCU basis, there is greater variation between the alternatives, the percentage of the old-growth stage that would remain in the Southeast Chichagof Project Area by 2000 is essentially the same for all action alternatives (84 percent). There would be an approximate 3 percent decrease in old-growth acres in the Project Area after implementation of any of the action alternatives. Likewise, looking at future harvest through 2011, there would be further decrease in the acres of the old-growth stage, provided an action alternative is then implemented. Otherwise, for a future no-action alternative, there would be no change in the old-growth stage harvested beyond the 2000 figure. A 3 percent further reduction is projected through 2011 with all the alternatives leaving approximately the same proportion of old-growth stage acres (81 percent). Through 2011, for the projected future harvest, a leveling across the VCUs would occur of the proportion of old-growth stage acres remaining in the Project Area.

Table 4-38

Projected Acres of Remaining Old Growth

	Acres	Alternative											
	In	A1/A2		B		C		D		E		F	
VCU	1961	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011
227	1,483	1,483	1,258	1,483	1,186	1,483	1,213	1,483	1,186	1,483	1,195	1,483	1,195
228	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052	6,052
229	7,880	7,575	7,575	7,575	7,575	7,575	7,575	7,575	7,575	7,575	7,575	7,575	7,575
230	4,812	4,515	3,990	3,789	3,699	3,862	3,793	4,210	3,757	4,165	3,784	3,841	3,737
231	7,460	7,134	6,331	6,545	6,017	6,691	6,140	6,670	6,021	6,824	6,057	7,134	6,021
232	5,542	5,274	4,647	4,520	4,358	5,271	4,472	4,909	4,400	4,801	4,425	5,274	4,402
233	5,033	4,746	4,291	4,183	4,045	4,273	4,273	4,424	4,077	4,338	4,094	4,365	4,097
234	3,575	3,049	3,000	2,566	2,566	2,569	2,569	2,773	2,773	2,797	2,797	2,658	2,658
235	20,501	20,372	20,372	20,372	20,372	20,372	20,372	20,372	20,372	20,372	20,372	20,372	20,372
236	8,355	6,204	6,204	6,204	6,139	5,865	5,865	5,953	5,953	5,865	5,865	5,865	5,865
237	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195	4,195
238	6,598	5,500	5,162	5,500	4,767	5,500	4,915	5,500	4,767	5,500	4,816	5,500	4,816
239	10,245	8,161	8,161	8,161	7,782	7,442	7,442	7,710	7,666	7,547	7,547	7,575	7,575
240	4,787	4,783	4,105	4,783	3,886	4,783	3,968	4,241	3,956	4,566	3,965	4,783	3,914
241	4,509	3,725	3,664	3,725	3,451	3,543	3,522	3,529	3,416	3,725	3,478	3,570	3,501
242	7,315	5,540	5,540	5,540	5,425	5,540	5,540	5,540	5,425	5,540	5,466	5,540	5,466
243	17,200	13,114	13,114	13,114	12,960	13,114	13,114	13,114	12,960	13,114	13,050	13,114	13,050
244	7,459	5,177	5,177	5,177	5,177	5,177	5,177	5,177	5,177	5,177	5,177	5,177	5,177
245	15,186	11,084	11,084	11,084	10,804	11,084	11,084	11,084	10,804	11,084	10,899	11,084	10,899
246	7,905	7,863	6,595	6,787	6,294	7,863	6,334	7,217	6,299	7,158	6,348	7,086	6,350
Total	156,092	135,546	130,517	181,856	126,753	132,254	127,476	131,730	126,833	131,878	127,157	132,243	126,917
% of 1961 Acres Remaining		87	84	84	81	85	82	84	81	84	81	85	81

SOURCE: Lilly 1992.

Floodplains and Wetlands

Direct and Indirect Effects

Floodplains

The numerous streams in the Southeast Chichagof Project Area make it impossible to avoid all floodplains during timber-harvest-related activities. Environmental consequences to floodplains from the alternatives are generally limited to effects from road construction. The small area of floodplains proposed for actual timber harvest would not affect flooding or erosion.

During road construction, both direct and indirect impacts to floodplains can occur. There may be no detectable influence, or there can be flow alteration in minor streams because of routing by roadside ditches and culverts. Channel and flow alteration can locally affect the velocity of the flows, width and depth of water, and the location of flow. Such factors can physically result in different erosion and sediment transport characteristics.

BMPs (USDA FSH 2509.22) are used to minimize impacts on floodplains as well as to protect roads and drainage structures. Examples of such practices include designing bridges and culverts to handle the expected flows, and installing frequent cross drains or ditch relief culverts to minimize erosion from large concentrations of water moving overland or where they enter natural drainages.

Logging activities are controlled to minimize damage to stream banks and bottoms from yarding, the process of conveying logs to a landing. Large wood in streams that contributes to stream stability and moderation of flow energy and velocity is generally left in place. In cases where large woody debris (LWD) upstream of bridges or culverts could move and block flow, it might be removed to ensure the passage of high flows without causing diversions and erosion.

None of the proposed alternatives would result in human occupancy of floodplains. Because the proposed action would have no floodplain development other than stream crossings, there would be no loss to property values from the proposed actions, nor would human health, safety, or welfare be adversely affected.

Because of the limited changes expected in floodplains as well as the naturally high amounts of precipitation and the runoff conditions, the risk characteristics related to flooding would not change to a significant degree as a result of activities performed under each of the alternatives. In general, road location, construction measures, and drainage structures will have negligible impact on the natural and beneficial uses of floodplains in the Southeast Chichagof Project Area.

Wetlands

Timber harvest and road-building activities will also have some impact on wetlands. Because of the climate, soils, and geology of the region, wetland areas are abundant and range from poorly drained, forested areas to very poorly drained nonforested muskegs. Road building in wetlands is unavoidable. Harvest units may also contain some forested wetland soils. Impacts may range from no impact at all to puddling, compaction, and altering the soil moisture regime. Other impacts are those similar (but to a much lesser extent) to soil displacement and erosion that have the potential for degrading upland timber harvest units. The techniques and measures required during road construction and those used to provide long service life on roads generally tend to preserve the natural values and functions of the affected wetlands. These techniques and measures include 1) the use of frequent culverts to allow water to pass freely, and, 2)

Effects on wetland areas from harvesting in the Project Area would be negligible.

permeable subgrade materials to avoid restricting the natural movement of water. In terms of the terrestrial environment, wildlife inhabiting wetlands may be reduced during periods of vehicle traffic on roads.

Soil moisture regimes and vegetation on some wetlands may be altered in some cases. However, these altered acres will still be classified as wetlands and function as wetlands in the ecosystem. In considering road building activities for the implementation of the Southeast Chichagof EIS, Alternative E results in the greatest area impact to wetlands (308 acres). Alternative D has the second greatest impact (287 acres), followed by Alternative B (265 acres), and Alternative F (252 acres). Alternative C (191 acres) affects the fewest acres of wetlands.

Direct impacts to wetlands from timber harvest are as follows: Alternative E results in the greatest area of wetlands affected by timber harvest (1,348 acres). This is followed by Alternative F with the second greatest impact (1,221 acres), Alternative D (507 acres), and Alternative B (502 acres). Alternative C (431 acres) affects the fewest acres of wetlands.

Construction and maintenance of the roads and landings will meet the BMPs (USDA FSH 2509.22). Use of BMPs will ensure that water flow, circulation patterns, and chemical and biological characteristics of the water within wetlands will not be impaired. Additionally, use of BMPs will ensure that damage to the aquatic environment will be minimized. In terms of the terrestrial environment, wildlife which inhabit wetlands may move to different areas during periods of vehicle traffic on the roads. The overall effect on 2.5 percent of the total wetlands acres in the Project Area would be negligible.

Table 4-39 displays the acres that proposed activities would affect either directly or indirectly on wetland areas.

Table 4-39

Acres of Wetlands Disturbance Resulting from Road Construction (RD) and Timber Removal (TM)

	Alternative														
	B			C			D			E			F		
VCU	RD	TM	Total	RD	TM	Total	RD	TM	Total	RD	TM	Total	RD	TM	Total
230	40	310	350	38	289	327	23	172	195	25	105	130	39	296	335
231	14	192	206	8	120	128	10	132	142	11	108	119	0	0	0
232	32	320	352	0	0	0	17	184	201	24	189	213	0	0	0
233	26	229	255	9	198	207	18	147	165	24	177	201	21	174	195
234	7	225	232	6	223	229	3	122	125	5	105	110	5	169	174
236	0	0	0	0	0	0	0	4	4	0	4	4	0	0	0
239	3	0	3	5	41	46	10	37	47	11	42	53	5	37	42
240	0	0	0	0	0	0	23	247	270	19	60	79	0	0	0
241	0	0	0	0	18	18	0	18	18	0	0	0	0	18	18
242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
245	5	0	5	0	0	0	2	0	2	2	0	2	2	0	2
246	57	131	188	0	0	0	45	201	246	54	207	261	49	243	292
Total	184	1,407	1,591	66	889	955	151	1,264	1,450	175	997	1,172	121	937	1,058
% of Wetlands			3			2			2			2			2
%t of Project Area			0.6			0.3			0.5			0.4			0.4

SOURCE: West and Huecker 1992b.

All alternatives would have potential impacts on 3 percent or less of the total wetland acres in the Project Area. Alternative E would potentially affect the most wetland acres with the location of both units and roads. Alternative F would affect the second largest area of wetlands, followed by alternatives B, D, and C. Alternative A1 would have no direct or indirect effects on wetlands.

Cumulative Effects

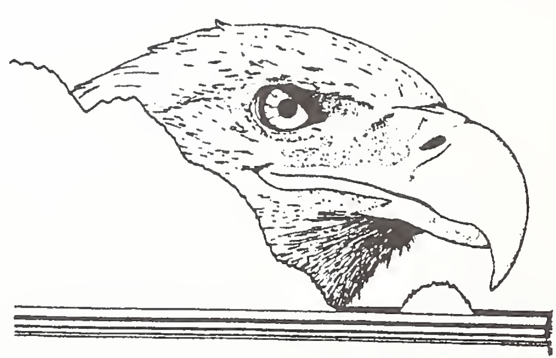
In considering cumulative effects (through the year 2011) relating to road building activities and timber harvest for the implementation of the Southeast Chichagof EIS, Alternative D results in the greatest impact to wetlands (3,568 acres). Alternative B has the second greatest impact (3,539 acres), followed by Alternative C (3,407 acres), Alternative F (3,351 acres), and Alternative E (3,339 acres).

Cumulative effects on floodplains and wetlands will vary little between alternatives because of the assumptions about levels of timber harvest scheduled through 2011 (Table 4-40). Potential cumulative impacts to floodplains are projected to affect less than 5 percent of the total floodplain acres under all action alternatives. Potential cumulative impacts to wetlands are projected to affect less than 6.2 percent of the total wetland areas in the Project Area (Table 4-40).

Table 4-40
Projected Acres of Proposed Activities on Wetlands Through Year 2011

	Alternative					
	A1/A2	B	C	D	E	F
Unit Acres	2,269	3,128	3,099	3,191	2,935	2,996
Road Acres	229	411	308	377	404	355
Totals	2,538	3,539	3,407	3,568	3,339	3,351
% of Total Wetlands Area	4.3	6.1	5.8	6.1	5.7	5.7
% of Project Area	0.9	1.2	1.2	1.2	1.2	1.2

SOURCE: West and Huecker 1992b.



Soils

In any forest management system involving timber harvest and road construction, soil disturbance is unavoidable. Even though steps are taken to mitigate these environmental impacts, it is not possible to eliminate all risk of soil disturbance. The severity of soil disturbance varies with management practice and location. This is dependent on such factors as parent material, soil drainage, frequency of drainage dissection, slope gradient, slope length, and slope shape. Consequently, these factors are used to rate soils in order to predict their relative probability of risk as a result of soil disturbance from management activities. The areas that are most susceptible to impacts from forest management were identified and eliminated from consideration for timber harvest. The areas that were eliminated included areas of extreme mass-movement hazard and areas which consisted of at least 40 percent of very shallow soils.

Soils impacts can be reduced by adhering to Soil Management Handbook Standards and Guidelines FSH 2509.18, BMPs of the Soil and Water Conservation Handbook, FSH 2509.22, and the application of erosion control provisions of the Timber Sale Contract. The Standards and Guidelines, BMPs, and contractual provisions include special logging techniques such as one-end or full-log suspension requirements, split-yarding techniques, directional felling, and the type of logging systems designed to be used for harvesting the timber. Other standard measures include seeding and fertilizing cut and fill slopes, revegetating landings, and installing waterbars on temporary roads. Site-specific soil mitigation measures are identified on the individual Unit and Road Cards (Appendices C And D).

Management activities include periodic soil surveys.

Soil disturbance in Southeast Alaska may occur through soil compaction, soil puddling, displacement of the soil resource, alteration of soil moisture regime, removal of the soil from the forest land base, and soil erosion. The most important impact to the soil resource as a result of implementation of the Southeast Chichagof Project would occur primarily as soil erosion. It would occur secondarily as soil displacement and removal of soil from the forest land base caused by dedicating this land to roads, landings, borrow pits, and administrative sites. Management induced landslides and increased frequency and magnitude of erosion are the most common consequences of forest management in Southeast Alaska. This can occur in all action alternatives of the Southeast Chichagof Project during and after harvest.

Other types of soil disturbance (soil compaction and soil puddling) may occur but are of limited extent, and would have minor impacts on the soil resource for the Southeast Chichagof Project. The degree of soil disturbance varies between VCUs as a result of watershed characteristics and between alternatives when differences in selected management options occur.

Regardless of the alternative, management activities may cause an increase in soil erosion over unmanaged natural conditions and a reduction in long-term soil productivity. A reduction in long-term soil productivity may occur where very thin, fragile soil mantles (formed directly over bedrock) are located in harvest areas where logs will be dragged across the ground. Soil productivity will be sacrificed in areas dedicated to roads, landings, and borrow sites. Soils can be damaged by compaction, displacement, or erosion from management activities or by mass movement following those activities.

Direct and Indirect Effects

Soil Erosion

Soil erosion is the detachment and transport of individual soil particles or aggregates of particles by wind, water, or gravity. The following assumptions were made for the analysis of environmental consequences.

- Surface or particulate erosion occurs as the loss of soil by wind, gravity or water, (both raindrop splash and overland flow).

- Mass wasting occurs when large masses of soil and/or rock fall, slide, or flow down a slope.

The direct effects of the proposed actions are those which remove ground cover and detach soil particles. Soils are considered detrimentally exposed to erosion when excessive amounts of ground cover are removed. The indirect effects include increases in soil erosion which result in loss of soil nutrients, loss of root habitat, alteration of seed bed, increased gullying, structural changes in landscape, and sediment transport.

Soil erosion through soil mass movement (landslides) is a significant factor in alteration of the forest landscape of Southeast Alaska. Impacts from timber harvest and road construction may significantly increase soil mass movement over that of natural conditions.

Road construction is one of the greatest contributors to management induced sediment production. Road failures, erosion of the road surface, and cut-and-fill slopes all contribute to sediment production. The greatest potential for sediment production is during the first 3 years after construction. After a period of time, the majority of erodible soil material from the road surface will have been removed, the cut-banks and fill-slopes will become vegetated, and surface erosion will become less serious. Road failures will, however, continue to be a problem if the road is not maintained or if it is not closed out properly.

Timber harvest may also contribute to sediment production. Surface erosion may increase if yarding activities expose the mineral soil by removing the organic mat. Landslides may be triggered by clearcutting. Tree roots, which contribute to the strength of the soil, deteriorate within 3 to 7 years after the trees have been cut. With the loss of the interlocking network of roots, the likelihood of soil mass movement increases. Clearcutting also opens up the forest to the forces of wind. Interior forests, lacking the presence of wind during root development, are not wind firm. This increases the likelihood of windthrow. Windthrow would also disturb the surface mantle, thereby causing an increase in surface erosion, which could act as a triggering device for debris avalanches and debris flows.

Displacement of Soil Surface Layers

Severely affected areas have detrimental displacement of soil surface layers. Surface soil layers cannot be replaced within the time period of this project. Also, severely affected areas are usually detrimentally compacted and are often subject to erosion. Heavily used skid trails, landings, and other log-handling areas, temporary roads, and unvegetated landslides are usually severely affected areas. Direct effects and indirect effects are a permanent loss of the soil resource from the site.

Soil Compaction

Soil compaction increases soil bulk density and decreases porosity as a result of the application of mechanical forces such as weight and vibration. Compaction increases with repeated application of compactive forces. Detrimental compaction decreases soil porosity by 10 percent or more from undisturbed values. Soil compaction may occur in shovel yarding activities in which machinery runs over a trail more than four times. Certain conditions elevate the risk of compaction. In general, silty soils under saturated conditions with very thin to no organic mat protection are very easily compacted, while dry, gravelly soils with thick (greater

than 2 inch) organic mat protection are not easily compacted. Initial studies indicate that because of the very thick organic mat forest floor which protects the soil, compaction from shovel yarding is not a significant problem in Southeast Alaska. (See Chapter 4, *Logging Systems,* for additional information concerning effects of each alternative.)

Direct effects of compaction result in the inability of tree roots to penetrate through the soil fabric and prevent them from taking up nutrients. This may result in the early death of tree roots in the vicinity of compaction which, in turn, reduces site productivity.

Indirect effects of compaction result in a 1- to-5-year decrease in soil porosity. This causes slower soil permeability, reduced nutrient uptake by roots, and the inability of roots to penetrat the soil fabric. Compaction can alter root habitats in such a way that the survival of certain vegetative species may be decreased; thus, altering the vegetative habitat for the site.

Soil Puddling

Puddling refers to depressions that tend to hold water. These sites remain wet for long periods of time, changing the moisture content of the soil; therefore, physical change in soil properties are caused by shearing forces that alter soil structure and reduce permeability. Detrimental puddling is defined as identifiable ruts or tracks caused by equipment operation on wet soils. Soil puddling may occur whenever large equipment is operated over wet ground. In general, low bearing strength soils such as fine silty soils or organic muck soils have a much greater susceptibility to puddling than do coarse textured, mineral soils. Soil puddling is generally of small extent because of the limitations of using heavy equipment on the wet, organic soils of Southeast Alaska.

Direct effects of soil puddling are death of tree seedlings and tree roots in the vicinity of soil puddling.

Indirect effects of soil puddling are long-term changes in soil permeability, loss of soil structure, increased soil saturation throughout the year, and decreased aeration of the soil. This altered soil changes from a productive forest site to a nonforest wetland-like habitat. Healing of these conditions may take a very long time.

Soil Displacement

Displacement is the horizontal movement of soil from one place to another by mechanical forces such as a blading, wheel slippage, and dragging logs. Soil displacement has been defined as the removal of the lesser of 3 inches or 50 percent of the topsoil, or humus-enriched surface soil, on an area 5 feet wide or more. Displacement occurs during road pioneering, borrow-pit preparation, shovel yarding, and cable yarding. In road pioneering and borrow-pit preparation, soil displacement is a necessary part of site preparation. (See *Timber* and *Road* sections of this chapter for additional information relating to each alternative.)

Direct effects of soil displacement are removal of the nutrient rich organic mat and top soil layer, exposure of mineral soil to rainfall impact, and dislodgement, erosion, and death of removed vegetation and tree roots.

Indirect effects of soil displacement are a change in soil productivity and site quality so that either long-term site degradation via erosion or a change in plant community occupying the site will occur. Typically, pioneer or successional plant communities will overtake the site and delay coniferous forest regeneration.

Altered Wetness

Drainage is sometimes impeded upslope from roads and trails because of compaction. Wet soils are less productive than drained soils in Southeast Alaska. Altered wetness is determined by either a 6 inch or greater rise in the soil water table or the death of overstory trees caused by higher soil water. Depth to the soil water table is determined after all snow has disappeared from the ground surface and at least three days have passed since the last snow-melt or rainfall.

Altered wetness occurs most often in marginally productive forest adjacent to muskegs. Under natural conditions, groundwater runoff from the forest is received by the muskeg. Road construction in these cases can alter the ground water hydrology so that water is no longer capable of draining into the muskeg. In effect, the groundwater table of the adjacent forest is raised and a change in soil moisture regime occurs. The forest soil becomes more poorly drained and a loss in soil productivity occurs. Altered wetness occurs in an extremely small portion of managed forest lands and is not considered a significant problem at this time.

Direct effects are a change in soil moisture regime and soil drainage so that timber productivity is reduced. Indirect effects are a permanent change in habitat type so that a type conversion to muskeg or noncommercial wetland forest occurs.

Roads and Timber Harvest

The following analysis of potential surface disturbance is based on professional judgement of soil scientists who have extensive experience in field operations in Southeast Alaska.
The following assumptions were made for this analysis:

- Soil disturbance resulting from road construction is 6 acres per mile; average disturbance occurs 25 feet either side of the center line.

- When averaged over all harvest acres, ground disturbance will be 10 percent of the harvested area.

Based on these assumptions, soil disturbance from proposed road construction and timber harvest activities which exceed the natural conditions in the No-Action, No Further Harvest Alternative A2 are shown in Table 4-41. Only those VCUs in which activities are proposed for the Project are displayed.

Table 4-41

Acres of Soil Surface Disturbance Resulting from Road Construction (RD) and Timber Removal (TM)

	Alternative														
	B			C			D			E			F		
VCU	RD	TM	Total	RD	TM	Total	RD	TM	Total	RD	TM	Total	RD	TM	Total
230	73	73	146	75	65	140	45	31	76	61	35	96	73	67	140
231	69	59	128	40	44	84	50	46	96	35	31	66	0	0	0
232	75	75	150	0	0	0	48	37	85	59	47	106	0	0	0
233	12	56	68	65	47	112	67	32	99	75	41	116	64	38	102
234	39	48	87	38	48	86	32	28	60	36	25	61	36	39	75
236	0	0	0	0	35	35	0	34	34	0	44	44	0	35	35
239	0	0	0	8	75	83	17	45	62	17	61	78	8	59	67
240	0	0	0	0	0	0	70	54	124	0	22	22	0	0	0
241	0	0	0	46	22	68	62	20	82	0	0	0	43	22	65
242	0	0	0	23	0	23	25	0	25	0	0	0	24	0	24
245	39	0	39	0	0	0	7	0	7	0	0	0	0	0	0
246	123	108	231	0	0	0	104	65	169	109	70	179	104	78	182
Total	430	419	849	295	338	633	527	391	918	392	377	769	352	338	690

SOURCE: West and Huecker 1992b.

As illustrated by the previous table, the greatest increase in surface disturbance would result from Alternative D, followed by Alternatives B, E, and F, with Alternative C causing the least surface disturbance. Lasting consequences from timber harvest and roads would continue for 3 to 15 years as the affected areas revegetate and recover.

The potential for soil mass movement (landslides) to occur on the selected timber harvest units and roads was assessed using the Chatham Area Soil Mass-Movement Hazard rating interpretations. These interpretations are based on the occurrence of landslides under undisturbed, natural forest conditions. Under managed forest conditions, it is assumed that the frequency of soil mass-wasting events will increase over that of natural conditions. For timber harvest and road construction, soils with extreme, high or moderate mass-wasting hazards are expected to have an increased level of mass-wasting above that of the Forest average for these categories. Soils with a low mass-wasting hazard are expected to have a mass-wasting level equal to or below that of the overall average of the Forest for these categories. Units and roads in the Project's alternatives all fall within areas that are rated as having a low, moderate, or high

mass-movement hazard. Since the harvest units and roads in these alternatives have been designed to avoid areas of extreme hazard, the areas of greatest concern are those that fall within the high hazard category for units and roads.

The frequency of landslides may increase as a result of timber harvest.

Table 4-42 shows the total area of soils mapped as having a high mass-movement hazard (MMHZ=H) and the total acres proposed for harvest under each alternative by VCU. Only those VCUs in which activities are proposed for the Project Area are displayed. These values do not represent area that would develop problems since only small, isolated slides scattered throughout these hazardous areas would likely occur. The values do, however, provide a relative means of comparing the alternatives. As indicated in the table, the harvest units in Alternative F would have the highest risk of mass movement, followed by Alternatives E, C, D, and B, in that order. Since Alternative A2 proposes no timber harvest, it would not affect high-hazard soils.

Table 4-42
Acres of High Hazard Soils (MMHZ=H) Proposed For Harvest

VCU	Alt. A2 MMHZ=H Acres	Alt. A2 Total Acres	Alt. B MMHZ=H Acres	Alt. B Total Acres	Alt. C MMHZ=H Acres	Alt. C Total Acres	Alt. D MMHZ=H Acres	Alt. D Total Acres	Alt. E MMHZ=H Acres	Alt. E Total Acres	Alt. F MMHZ=H Acres	Alt. F Total Acres
230	0	0	187	726	155	653	79	305	95	350	187	674
231	0	0	148	589	75	443	74	464	67	310	0	0
232	0	0	210	754	0	3	37	365	124	473	0	0
233	0	0	231	563	254	473	230	322	208	408	230	381
234	0	0	146	483	146	480	94	276	76	252	139	391
236	0	0	0	0	301	339	214	251	314	339	301	339
239	0	0	0	0	421	719	278	451	394	614	394	586
240	0	0	0	0	0	0	87	542	31	217	0	0
241	0	0	0	0	109	182	109	196	0	0	109	156
246	0	0	354	1,076	0	0	165	646	201	705	228	777
Total	0	0	1,276	4,191	1,461	3,292	1,367	3,818	1,510	3,668	1,588	3,304

SOURCE: West and Huecker 1992b.

Table 4-43 shows the area of roads affecting high mass-movement hazard soils (MMHZ=H) and total area of roads proposed for each alternative. Only those VCUs in which activities are proposed for the project are displayed. As indicated in the table, the roads that would access Alternative B would have the highest risk of slope failure. This is followed by Alternatives D, E, F, and C, in that order; although the difference between the alternatives is minor. Alternatives A1 and A2 would not affect high-hazard soils as it proposes no new road construction or reconstruction.

Table 4-43
Acres of High Hazard Soils (MMHZ=H) Proposed For Roading

VCU	Alt. A2 MMHZ=H Acres	Alt. A2 Total Acres	Alt. B MMHZ=H Acres	Alt. B Total Acres	Alt. C MMHZ=H Acres	Alt. C Total Acres	Alt. D MMHZ=H Acres	Alt. D Total Acres	Alt. E MMHZ=H Acres	Alt. E Total Acres	Alt. F MMHZ=H Acres	Alt. F Total Acres
230	0	0	7	73	6	75	2	45	5	61	7	73
231	0	0	1	69	0	40	0	50	1	35	0	0
232	0	0	1	75	0	0	1	48	1	59	0	0
233	0	0	8	12	8	65	8	67	8	75	8	64
234	0	0	2	39	2	38	2	32	2	36	2	36
236	0	0	0	0	13	0	13	0	13	0	13	0
239	0	0	0	0	6	8	6	17	6	17	6	8
240	0	0	0	0	0	0	0	70	0	0	0	0
241	0	0	0	0	2	46	2	62	0	0	2	43
242	0	0	0	0	0	23	0	25	0	0	0	24
245	0	0	10	39	0	0	4	7	0	0	0	0
246	0	0	2	123	0	0	2	104	2	109	2	104
Total	0	0	50	430	37	295	40	527	38	392	40	352

SOURCE: West and Huecker 1992b.

Increase in the incidence of mass wasting over natural occurrence, the No-Action Alternatives, can be evaluated by assuming a 3.5 times increase over natural occurrences on managed acres (Swanston 1989). The increase in potential mass-wasting is directly related to timber harvest and road building on high hazard soils. It is estimated that mass wasting would occur on 10 percent of the acreage of harvest units on high hazard soils and on 30 percent of the road acres on high hazard soils. Table 4-44 displays the results of this evaluation. Only those VCUs with proposed activity are displayed.

Table 4-44
Acres of Potential Mass Wasting Above Natural Level Resulting from Combined Effects of Timber Removal and Road Construction

	Alternative				
VCU	B	C	D	E	F
230	19	16	8	10	19
231	15	8	7	7	0
232	23	2	4	12	0
233	23	25	23	21	23
234	15	15	10	8	14
236	2	33	21	31	30
239	3	43	28	41	39
240	1	4	11	3	0
241	0	13	12	0	13
246	35	0	20	23	23
Total	136	157	145	156	161

SOURCE: West and Huecker 1992b.

Alternative F would have the greatest potential increase in mass wasting over the No-Action Alternative. This is followed by Alternatives C and E which have similar effects, then Alternative D. Alternative B has the least increase. The potential increase in mass wasting would be minor for all action alternatives.

Cumulative Effects

Cumulative effects are the accumulation of effects from individual management practices which, when combined, have a potentially greater effect than the sum of the individual effects. These effects may manifest themselves through time and/or accumulate through time and space into impacts which may be distributed further downstream. Individual direct effects from timber harvest which result from soil disturbance cause a loss of soil productivity as well as changes in erosion and transport rates, volumes of sediment, and water transported. The physical on-site effects are loss of nutrients and topsoil and depreciation of soil-moisture recharge, compaction, soil temperature increases (caused by vegetative cover reduction) and changes in habitat suitability. Physical off-site effects are sediment production and transport, degraded water quality, increased structural damage, flood risk, channel bank instability, and degraded fish habitats.

Soil disturbance results in changes in the way rainfall runoff and/or groundwater move over the landscape. Soil nutrients may become temporarily unavailable for plant uptake. Two primary results of soil erosion are 1) alteration of the site by the loss of the soil resource, and 2) sediment production and transport off site. Alteration of the site involves loss of the soil medium for plant establishment and growth. No longer is there a sufficient soil medium for seedling survival, neither is there a rooting medium available which is necessary for plant growth. Even where there is sufficient subsoil available for seedling survival and rooting, the vast majority of soil nutrients which reside in the organic and topsoil layers are now lost. Water runoff from the site increases dramatically as the vegetation, organic duff layer, and the developed upper soil horizons are no longer available to function as a sponge. Rainfall impact on the subsoil detaches soil particles and allows erosion to occur. As more area is affected by the effects of forest management, the potential for more erosion and transport increases.

Interlocking tree root systems decompose over a period of three to seven years, resulting in a loss of slope stability after harvest. Sites with a high mass movement hazard may experience up to five times the mass wasting experienced on the same soil under natural forest conditions (Swanston 1989). Slope failures may occur in increasing numbers from 3 to 7 years after timber harvest and then taper off to near stable conditions within 15 years. Afterwards the site can be said to be "reclaimed" from management-induced mass wasting. In most cases, slope stability will have returned to normal.

Cumulative impacts from timber management activities on soils include loss of productive soil base from roads; landings and borrow pits which remove land from the productive soil base; and impaired soil productivity for vegetative growth, resulting from the scarification and erosion after timber harvest and from landslides.

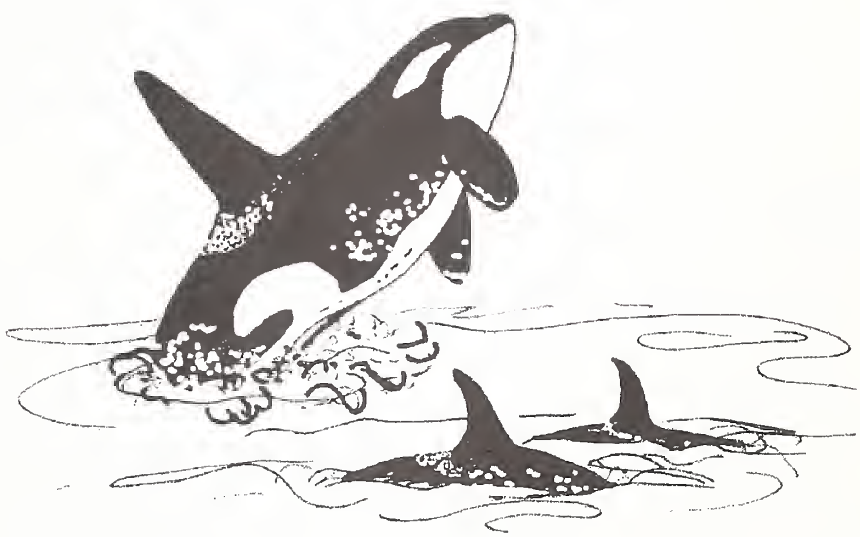
Depending on the alternative selected, some or all of the VCUs (except VCUs 228, 229, 235, and 237) within the Southeast Chichagof Project Area would be entered again for timber harvest before the end of the contract period in the year 2011. Refer to Table 4-1 in the *Introduction* section of this chapter for projection of harvest though 2011. The intensity of timber harvest depends on the alternative selected for the future project(s). Table 4-45 displays the cumulative effects projected through the life of the contract.

Table 4-45
Cumulative Acres of Soil Disturbance

	1992				1996				2011			
Alt.	MW	SD	RD	Total	MW	SD	RD	Total	MW	SD	RD	Total
A1/A2	258	150	419	827	254	117	358	729	717	561	680	1,959
B	254	150	419	824	387	530	546	1,463	581	334	527	1 ,442
C	165	136	419	721	260	449	469	1,178	379	547	636	1 ,562
D	160	150	415	725	231	363	696	1,290	379	441	654	1 ,474
E	160	150	415	725	246	488	619	1,353	367	473	663	1 ,503
F	160	150	415	725	243	449	555	1,247	399	501	661	1 ,561

SOURCE: West and Huecker 1992b.
Note: MW = Mass Wasting
SD = Soil Displacement
RD = Roading

Comparison of the potential cumulative impacts of the alternatives reveals that given the projected harvest through 2011, mass wasting, soil displacement, and road-related impacts would increase for the Southeast Chichagof Project Area. Alternative A1/A2 shows a gradual stabilization in 1996 from natural and management-activity-induced land disturbance in 1992 until the projected future harvest occurs, at which time land disturbance increases. The recovery process would have continued further had a No-Action Alternative been projected for future entry. For Alternative B, the greatest disturbance occurs and continues through 2011, with a slight decrease in disturbance. The remaining Alternatives C, D, E, and F show increases in land disturbance. However, a No-Action Alternative projection for future harvest for any of the alternatives would show a recovery from the activities proposed for this entry. In all instances, the proposed actions would implement Soil and Water Conservation Handbook standards and guidelines, and BMPs to minimize soil disturbance.



Water and Fish

One of the major issues identified in public scoping for the Southeast Chichagof Project addressed the concern for protecting water quality in streams that provide habitat for anadromous and resident fish. The effects of the many land management activities on resident and anadromous fish resources are very complex and not easily quantified. The following sections discuss the types of effects, how they affect water quality and quantity, and the risks and magnitude of the expected effects. Potential effects are categorized as direct, indirect, and cumulative. Within these three major categories are two sub-categories: 1) physical effects, and 2) biological effects. Physical water quality effects may ultimately become biological effects if they affect fish production.

Concern with effects of the alternatives on anadromous fish like salmon was expressed in public scoping.

Direct and Indirect Effects

Sediment

Some increases in sediment delivery to streams above naturally occurring rates can be expected to result from timber harvesting and road construction activities (Rice et al. 1979; Furniss et al. 1991; Chamberlin et al. 1991). Estimates to date of sediment delivery to Southeast Alaska streams from timber harvesting indicate that sediment increases are minimal and not distinguishable from natural fluctuations in sediment yield at the watershed level (Paustian 1987). Potential consequences of sedimentation to fish habitat productivity include degradation of spawning gravels, channel widening, loss of bank cover, loss of pools, and channel dewatering. These habitat changes can adversely affect adult salmon, char, and trout, as well as rearing juvenile salmonids (Chamberlin 1982; Chamberlin et al. 1991). Application of BMPs will minimize sediment delivery to streams by controlling surface erosion from roads and harvest units, by avoiding or mitigating landslide hazards, and by properly designing and installing road drainage and stream crossing structures.

Road-related Sediment

Research data indicate that most of the sediment increases attributed to timber harvesting activities are associated with roads (NCASI 1979). Erosion and sedimentation from channel disturbance associated with construction of stream crossing structures, road use, and maintenance will result in small increases in turbidity and fine sediment transfer to streams and lakes. The majority of increased sediment transfer occurs 2 to 5 years following initial road construction. Sediment would be generated in each action alternative from short- and long-term land disturbing activities. Sediment generation and delivery to streams is roughly proportional to the amount of road constructed, the amount of use, the number of stream crossings, how close the road is to the stream, and the area of hazard soils disturbed. Construction of new roads exposes soil to erosive forces. This results in sediment delivery to streams. Clearing and grubbing for bridges and culverts can increase sediment delivery to streams, as can timber harvest within streamside riparian areas. Roads on steep slopes can generate sediment from landslides. In a few instances, this may directly affect streams.

As use subsides and exposed soil becomes covered with vegetation, the rate of soil displacement and delivery to stream channels is generally reduced (Reid and Dunn 1984). In the case of roads, much depends on whether the road is revegetated and closed or remains open to traffic. Long-term use of the Southeast Chichagof road system by heavy log trucks is unlikely. Therefore, sediment generated from road use and maintenance after the initial harvest period (2 to 3 years) would be negligible. Short-term (1 to 2 days) water quality degradation near construction activity is probable. However, implementation of BMPs for road construction and maintenance will reduce the likelihood of chronic or long-term impacts to downstream water quality (sediment or turbidity) or stream channel stability.

Sediment monitoring of three small tributaries to the Kadashan River near Tenakee was undertaken to measure on-site sediment produced by construction of road drainage culverts (Paustian 1987). The initial pulse of sediment produced during grubbing, culvert bedding, and fill placement dissipated over a 48-hour period. This sediment pulse was roughly equivalent to the sediment released during a typical fall storm event under natural conditions. Similar results were obtained from short-term monitoring of bridge and culvert placement at seven other Tenakee Inlet watersheds (Stednick et al. 1978).

Reconstruction of old roads can also provide opportunity to improve habitat conditions. Old bridges and culverts will be replaced and, where necessary, improved to provide passage for adult and juvenile salmonids. Improved road access to previously logged streamside areas can assist projects which hasten recovery to prelogging conditions.

In Alternatives A1/A2, No Action, the situation would remain similar to what it is today. No additional soil disturbance from management activities would occur and sediment generation would not increase over present levels. Areas formerly logged and roaded would continue to stabilize and revegetate. Old stream crossing structures impeding fish passage would remain in place until modified by natural forces or until inventoried and corrected in future projects.

Alternative C would concentrate harvest mostly in previously harvested VCUs (230, 231, 233, 234, 236, 239) and VCU 241. It has the fewest miles of new road constructed, least riparian acreage impacted by roads and fewest acres of harvest on high hazard soils (Paustian et al. 1991). In addition, this alternative has the fewest miles of road delivering sediment directly to Class I streams and the fewest road miles contributing sediment to Class I streams via Class II and Class III streams. Road construction and reconstruction miles in Alternative C are the least of all alternatives (Table 4-97). This alternative does not enter Basket Lake, Long Bay, Seal Bay, or West Crab Bay. It would most likely generate the least sediment impacts of the action alternatives.

Alternative F would concentrate harvest in VCUs 230, 233, 234, 236, 239, 241, and 246. It has the next fewest miles of road reconstruction, next fewest miles of new construction, next fewest acres of hazardous soils harvested and of miles of road delivering sediment directly to Class I streams. It also has the fewest miles of potential road sediment delivery to Class I streams via Class II and Class III streams. It would, most likely, generate the second to the least sediment impacts.

Alternative D would attempt to distribute impacts across the area by spreading harvest among VCUs 230 to 234, 236, 239 to 241, and 246. It has the second greatest amount of new road construction, second highest acreage of hazardous soils disturbed and potential delivery of sediment to Class I streams via Class II and Class III streams, and the second greatest miles of roads delivering sediment directly to Class I streams.

Alternative B would concentrate harvest in VCUs 230 to 234, and 246 and harvests the greatest volume of timber, but Alternative D disturbs the most ground. Alternative B has the greatest mileage of new and reconstructed road, the most harvest on hazardous soils, and the greatest direct road delivery potential of sediment to Class I streams (Paustian and Kelliher 1991). The highest delivery of sediment via Class II and Class III streams and fewest (one) LTFs would occur under Alternative B (Table 4-100).

Alternative E attempts to harvest away from salmon streams and lake riparian areas, harvesting in the upper valleys and higher elevations of VCUs 231 to 234, 236, 239, 240, and 246. This alternative has more road construction than Alternative C, but less than Alternative B (Table 4-97). It has the second greatest potential to deliver sediment indirectly from Class I streams (Paustian and Kelliher 1991). It disturbs the greatest amount of wetlands during road construction and timber harvest where it ranks first with 1,702 acres as compared to Alternative C, which disturbs the least, with 431 acres (Table 4-39).

The extent to which stream crossings deliver sediment to channels depends on the maintenance strategy applied after harvest. If culverts and bridges continue to be maintained, little additional sediment is delivered to channels. If culverts and bridges are left in place and fail because they are not regularly maintained, large pulses of sediment can be delivered downstream. Removal of culverts and bridges and restoration of the original channel configuration would generate some short-term sediment which would be greatly reduced over time.

The number of "high risk" stream crossings for specified roads in the Southeast Chichagof sale area are listed in Table 4-46. These high risk crossings were determined from channel type inventory information and indicate which drainage structures have a high risk of failure because of high bedload or debris transport rates. Only those VCUs in which road construction or reconstruction would take place in one or another of the alternatives is included.

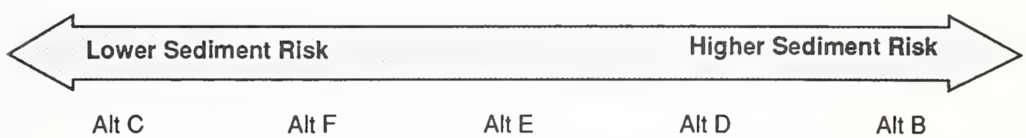
Table 4-46
Number of High Risk Stream Crossings

VCU	Alternatives A1/A2	B	C	D	E	F
230	0	7	7	2	5	7
231	0	18	15	16	7	0
232	0	24	0	17	17	0
233	0	13	11	13	13	11
234	0	12	12	12	14	11
240	0	0	0	12	1	0
246	0	32	0	25	32	29
Total	0	106	45	97	89	58

SOURCE: Kosak and Allio 1992.

Alternatives B and D have the highest risk of affecting water quality and fish habitat as a result of washout of road drainage structures. Alternative C is expected to have the least impacts associated with long-term drainage structures. These crossings were identified and are addressed on the Road Design Cards (Appendix D). The long-term effects of road drainage system failure on water quality should be minor with the road maintenance BMPs implemented. BMPs will be prescribed for each of the high risk crossings based on-site specific design needs during timber sale layout in order to lower the risk of drainage structure failure. Figure 4-1 displays a general rating of the alternatives for sediment inputs from road erosion.

Figure 4-1
Relative Rating of Alternatives for Sediment Deposit from Roads



SOURCE: Paustian and Kelliher 1992.

The effectiveness of BMPs is primarily determined by the degree to which instream water quality meets State water quality standards (Forest Service 1991b). Turbidity (an optical measurement that is an indirect measure of sediment in the water column) and suspended sediment concentration (a direct gravimetric measure of sediment) are two of the most common parameters used to assess sediment-related water quality concerns. Generally, a fair correlation exists between these two measures of sediment (EPA 1991). Although numerical turbidity standards are included in the Alaska State water quality regulations, turbidity measurements are difficult to routinely apply to the regulation of nonpoint source sediment which results from timber harvest activities. Therefore, the EPA has determined that the reasonable implementation, application, and monitoring of BMPs can be expected to achieve compliance with the intent of the Clean Water Act. Water quality studies conducted in Southeast Alaska indicate that except for short-term localized deviations from numerical standards, BMPs are effective in maintaining sediment concentrations within State water quality standards (Paustian 1987).

Streambank and Channel-related Sediment

Riparian vegetation serves a very important function in maintaining streambank and floodplain stability (Meehan et al. 1977). Riparian vegetation retards the movement of sediment and woody debris within floodplains. Root mats of streamside vegetation have a critical role in maintaining streambank structure and controlling streambank erosion. Harvesting riparian timber would likely have direct consequences on fish habitat productivity (Chamberlin 1982). The TTRA requires a riparian buffer "no less than one hundred feet in width on each side of all Class I streams and on those Class II streams which flow directly into Class I streams." Implementation of riparian management prescriptions will eliminate streamside harvest activity on Class I anadromous fish streams and along most Class II resident fish streams. This management approach should result in minimal changes to stream morphology and fish habitat conditions in these streams. Riparian harvesting restrictions are designed to minimize impacts related to streambank disturbance, canopy alteration, and large woody debris recruitment. Blowdown of riparian buffer strips may result in increased bank erosion and possibly increase channel migration in localized Class I and Class II channel segments.

Buffer zones on all Class I and some Class II streams will help preserve fish habitat conditions under all alternatives.

Implementation of BMPs for harvest units that might otherwise encroach on riparian areas along water quality streams (Class III streams) will also greatly reduce the potential for sediment transfer to downstream Class I and II fish streams. In most instances, current unit design stops unit boundaries on the slope break above Class III streams. In general, effects of timber harvest on streambank and channel stability should be negligible. See *Mitigation Measures Common to All Action Alternatives* in Chapter 2 for a discussion of the stream buffering that will be done on Class I, II, and III streams.

Mass-wasting Related Sediment

Road construction and timber harvesting activities would increase the risk for mass-wasting events such as debris torrents in Class III channels and debris avalanches from unstable mountain sideslopes. However, only a small percentage (3 percent) of natural and management induced mass wasting would directly impact fish streams (Swanston 1991).

The potential for mass-wasting related impacts to Class III upland channels would vary somewhat for individual stream channel segments affected. Impacts can be substantially mitigated by limiting the type and extent of harvest activities that take place immediately adjacent to channel banks and ravine sideslopes. In most cases, harvesting would not take place within ravine sideslopes adjacent to incised upland stream channels. Therefore, changes in sediment delivery and large woody debris recruitment would be minimized. However, increased susceptibility to blowdown on gully sideslopes following harvest of adjacent timber stands may substantially reduce, in some areas, the effectiveness of this mitigation strategy.

The occurrence of mass-wasting events and the fate of sediment generated by such events that may result from timber harvest activities cannot be precisely determined. Therefore, a sediment transfer hazard rating was used to evaluate the relative risk of sediment from mass-wasting events associated with proposed units and roads being delivered to streams, and the potential for affecting beneficial uses in Class I and Class II fish streams (Hogan 1989). Sediment transfer potential from roads and harvest units are evaluated separately for each VCU by alternative.

Those alternatives having greater portions of high hazard soils would have the most potential for sediment deliverable to Class I streams. Sediment delivery to Class I streams is broken down into two separate categories: direct delivery to Class I streams displayed in Tables 4-47 and 4-48 and indirect delivery to Class I streams from Class II or III tributaries displayed in Tables 4-49 and 4-50.

Table 4-47
Acres of High Hazard Soil (Within Harvest Units) with Direct Sediment Delivery Potential to Class I Streams

	Alternative				
VCU	B	C	D	E	F
230	85	85	36	49	85
231	39	20	1	2	0
232	83	0	29	29	0
233	0	0	0	0	0
234	0	0	0	0	0
236	0	0	0	0	0
239	0	229	184	224	224
240	0	0	0	0	0
241	0	1	0	0	1
246	101	0	62	78	83
Total	308	335	313	382	394
Percent of Total Harvest	7.1	9.8	7.9	9.3	11.4

SOURCE: Paustian and Kelliher 1992.

Table 4-48
Miles of Roads with Direct Sediment Delivery Potential to Class I Streams

	Alternative				
VCU	B	C	D	E	F
230	0.84	0.78	0.39	0.45	0.84
231	1.35	0.89	0.90	0.37	0.00
232	4.49	0.00	1.48	2.33	0.00
233	5.33	5.73	4.95	5.06	4.35
234	2.00	1.99	1.75	1.63	1.68
236	0.89	0.89	0.89	0.89	0.89
239	0.76	0.76	0.76	0.76	0.76
240	0.00	0.00	1.77	0.62	0.00
241	0.53	1.37	0.80	0.53	1.04
246	2.20	0.06	1.60	2.39	2.17
Total	18.39	12.48	15.31	15.02	11.72
Percent of Total Mileage	22	26	18	21	20

SOURCE: Paustian and Kelliher 1992.

Table 4-49
Acres of High-hazard Soil with Indirect Sediment Delivery Potential to Class I Streams

	Alternative				
VCU	B	C	D	E	F
230	31	18	0	18	31
231	41	32	32	27	0
232	64	0	0	55	0
233	0	0	0	0	0
234	48	48	43	48	48
236	0	99	13	112	99
239	0	76	58	73	73
240	0	0	87	31	0
241	0	109	109	0	109
246	217	0	68	96	113
Total	402	381	410	460	474
Percent of Total Harvest	9.3	11.1	10.3	11.9	13.7

SOURCE: Paustian and Kelliher 1992.

Table 4-50
Miles of Road with Indirect Sediment Delivery Potential to Class I Streams

	Alternative				
VCU	B	C	D	E	F
230	0.29	0.17	0.02	0.27	0.29
231	0.32	0.32	0.32	0.00	0.00
232	0.40	0.00	0.39	0.39	0.00
233	0.00	0.00	0.00	0.00	0.00
234	1.07	1.07	0.83	0.76	1.05
236	1.73	1.73	1.73	1.73	1.73
239	1.26	1.26	1.26	1.26	1.26
240	0.00	0.00	1.40	0.24	0.00
241	0.00	0.55	0.63	0.00	0.63
246	1.34	0.00	0.41	1.10	1.10
Total	6.40	5.11	6.99	5.75	6.06
Percent of Total road mileage	8	10	8	8	10

SOURCE: Paustian and Kelliher 1992.

Results of this mass wasting risk assessment for roads and units in the action alternatives indicate that Alternative C has a relatively low overall risk of sediment delivery to streams. Alternatives F and E have higher risks of mass wasting sediment being generated from harvest units, and Alternatives B and D have higher risks of sediment delivery from road related mass wasting.

Stream Flow

A large body of scientific literature exists on the effects of timber harvesting on water yield from forested stream basins. These research results indicates that a minimum harvest level of 25 to 35 percent of a drainage basin is generally required before measurable increases in water yield occurs. Water yield studies in the Pacific Northwest have shown a 25 percent average increase in annual water yield for 5 to 10 years following 25 to 100 percent clearcut harvest of the study watersheds (Rothacker 1965, 1970; Rothacker et al. 1967; Harr 1976, 1983). No increases in fall peak flows have been observed in rain dominated, coastal watersheds except in cases where a high percentage of a watershed is compacted by roads and skid trails. Recent studies in the Northwest have shown that harvesting in the transient snow zone has increased the magnitude of winter peak runoff events in the Cascade Mountains of Oregon (Christner and Harr 1982; Harr 1981).

Water yield responses to timber harvest activities have received very little study in Southeast Alaska watersheds. No measurable changes in streamflow were observed in the Maybeso watershed following clearcutting of 25 percent of the drainage basin (Meehan et al. 1969). An analysis of the Stanley Creek drainage basin following a 35 percent clearcut harvest did show significant increases in summer low flows (Bartos 1989). Several variables, including elevation, aspect, basin geomorphology, soils, vegetation cover, geology, snow storage and precipitation patterns, cutting unit size, distribution of units within the watershed, and scheduling of harvest entries, will all influence stream runoff.

Timber harvesting effects on stream runoff in the Southeast Chichagof Proejct Area are expected to be minimal for all action alternatives. This is because of the relatively low percentage of watershed area affected by harvesting activity and because of harvest units that are well dispersed throughout the drainage basins.

Temperature Change or Dissolved Oxygen Depletion

Timber harvesting in Class III riparian areas is expected to result in minor changes to the stream temperature regimen of Southeast Chichagof Project Area streams. By maintaining 100-foot minimum buffer strips adjacent to Class I and Class II streams, the effects of harvesting small headwater drainages would be substantially mitigated. A 50- to 80-foot wide streamside leave strip has proven to be effective in attenuating solar radiation and reducing stream temperature increases (Brown et al. 1971). Stream temperatures in northern Southeast Alaska do not generally exceed the maximum temperature threshold of 20 °C set by State water quality criteria. No watersheds in the Project Area have been designated as potentially temperature sensitive. Effects of timber harvesting and road construction on stream temperatures and dissolved oxygen are expected to be negligible for all alternatives.

Stream Nutrient Cycling

Research on coastal forest watersheds has measured only slight releases of key dissolved nutrients such as nitrates that resulted from clearcutting and slash burning treatments (Fredriksen 1971). In Southeast Alaskan forest ecosystems, dissolved nutrients are tightly

bound by soil organic matter and plant root hairs. Soil and water chemistry monitoring on a small sub-basin that was clearcut and burned in the Pavlof drainage near Tenakee measured no loss in total nitrogen and only slight leaching of potassium, magnesium, and phosphorus into surface waters (Stednick et al. 1982). The results of these investigations indicate that no measurable effects to chemical water quality or aquatic productivity would occur as the result of clearcut harvesting in the Southeast Chichagof area.

Habitat Capability for Fish Management Indicator Species (MIS)

As discussed in Chapter 3, pink salmon, coho salmon, and Dolly Varden char have been designated MIS. These species depend on spawning and rearing habitat to complete their life cycles. The quality and quantity of habitat on Forest lands determines, to a great degree, the harvestable surplus available to the various user groups.

Pink salmon habitat capability relies on survival in the spawning gravels during the egg incubation period. A number of studies have shown a relationship between egg survival and water quality criteria, including inter-gravel sediment, temperature, water flow, and other factors (Reiser and Bjornn 1979).

Studies and analyses of Southeast Alaska's pink salmon (including relationships between instream sediment, egg survival, and pink salmon returns to streams) have been conducted (Sheridan et al. 1984; Pella and Myren 1974; Sheridan 1982). None of these studies have provided a conclusive link between upland management and reduced numbers of returning fish.

While a direct link has not been established for pink salmon in Alaska but has been for other salmonids elsewhere, it would be prudent to minimize sediment delivery to pink salmon streams. The establishment of BMPs seeks to minimize sediment generation and delivery to stream channel systems. The implementation of BMPs and legislation establishing buffer strips should minimize sediment impacts; however, differences between alternatives are likely to exist.

Coho salmon and resident Dolly Varden habitat capability is dependent not only on available spawning area but also on rearing area. Coho juveniles spend up to 3 years in fresh water; Dolly Varden may spend their entire lives in fresh water. During this time both species rely on habitat structure for hiding and survival cover. A large part of this cover is provided by LWD. It is generally accepted that the rearing phase of these species' life cycle is the most limiting (Murphy et al. 1986).

Stable pieces of large wood in the stream channels are among the primary fish habitat-producing components on the forest. LWD and associated organic matter provide energy and habitat structure for fish and aquatic invertebrates and influence such physical factors as sediment storage and channel development. Management activities can influence the amount and rate of LWD recruitment to the stream. The direct effect of reduced large wood input is usually lower habitat quality. As complexity and diversity of habitat is reduced, fish production is also reduced.

Only large, woody debris that directly threatens the integrity of stream crossings will be removed. Through the use of stream buffers on Class I and II streams and BMPs, the reduction of LWD should be minimal.

Table 4-51 displays the width and length of Class I and II stream buffers for proposed harvest units and the alternative in which each of these units is included. Only those VCUs in which harvest is proposed are displayed. Alternative A1/A2 is not displayed as it proposes no harvest.

Table 4-51
Class I and Class II Stream Buffer Width and Length

VCU	Unit Number	Buffer Width (feet)	Buffer Length (feet)	Alternatives B	C	D	E	F	Reason(s) that Buffer Width Exceeds 100 Feet[1]
230	1540	150-200	800	X	X		X	X	S
	1572	100	1,000	X	X	X	X	X	
	1590	150-250	800	X	X	X	X	X	S, W
	1593	150-500	850	X	X	X			N, S
	1620	100-200	1,600	X	X		X	X	C, S
	1650	100-400	3,300	X	X			X	S, T
	1660	100	250	X				X	
	1670	100-450	2,350	X	X			X	NC
	1720	200-300	2,300	X	X		X	X	NC, NF
	1730	100	800	X	X		X	X	
	1731	100-300	1,000	X	X		X	X	NC
	1750	100-200	1,700	X	X		X	X	NC
	1780	100-350	2,300	X			X	X	NC, NF
231	2100	100-300	1,200	X		X			NF
	2110	100	900		X	X			
	2140	200-500	2,200	X	X	X			S
	2141	100-200	1,100	X	X				R
	2142	100	1,100	X	X				
	2170	150-800	4,500	X	X	X	X		NC, R, S
	2192	100-400	3,300	X			X		S, T
	2200	100	1,000	X			X		
	2300	100	100	X			X		
	2340	200-700	2,000	X					NF, R, S
	2350	200-800	900	X		X	X		NC, NF, S, W
	2390	100-400	2,500	X	X	X	X		NF, R, S
232	2440	100-1,100	5,500	X		X	X		NC, NF, S
	2450	100-500	1,700	X			X		R
	2451	200-500	2,200	X			X		R
	2480	100-200	2,700	X		X	X		C, T
	2490	100-300	1,700	X					S, T
	2491	100	200	X					
	2520	100	400	X					
	2540	100-750	4,400	X		X			NF, R, S
	2570	100-700	2,600	X		X	X		NF, R, S
	2580	100	2,900	X			X		
	2600	300-400	700	X					T, W
	2630	100	50	X					
	2650	150-500	2,100	X			X		C, NC, S, T
	2660	250-400	600	X					T, W

Table 4-51 (continued)

Class I and Class II Stream Buffer Width and Length

VCU	Unit Number	Buffer Width (feet)	Buffer Length (feet)	Alternatives					Reason(s) that Buffer Width Exceeds 100 Feet[1]
				B	C	D	E	F	
233	1960	200-300	600	X	X			X	S
	1971	250-750	900	X		X		X	C, R
	1980	100-800	1,800	X	X	X	X	X	NC, R, S
234	1800	200-300	700	X	X			X	C, S
	1810	200-700	2,500	X	X	X	X	X	NF, S
	1850	100	1,300	X	X	X	X	X	
	1852	100-450	1,200	X	X	X		X	C, R, T
	1870	100	300	X	X	X			
	1880	200-400	500	X	X				S, W
236	No harvest units are proposed that require a Class I or II Stream Buffer.								
239	1140	100	200		X		X	X	
	1162	100	200		X		X	X	
	1240	150-300	400		X	X	X	X	S, T
	1260	150-200	250		X	X	X	X	S
	1270	100-200	200		X	X	X	X	T
	1311	100	500		X	X	X	X	
	1320	100-800	4,100		X	X	X	X	NC, NF
	1330	100	1,100				X		
	1370	100	400		X				
	1401	100	150		X				
240	2730	100	2,200			X			
	2742	100	1,300			X			
	2750	100	300			X			
	2761	100	500			X			
	2770	100	300			X	X		
	2790	100-550	3,950			X			NC, NF
	2800	100	1,500			X	X		
	2820	100-600	2,200			X	X		NF
	2821	100-600	1,100			X	X		NC, NF
	2850	150-250	300				X		S, T
	2860	100-500	1,400			X			NC
241	3031	100	2,000		X	X		X	
	3050	100-500	1,600		X	X		X	R
	3051	100	1,100		X	X		X	
	3070	100-250	2,600		X	X		X	C, S
	3100	100	2,050		X	X		X	

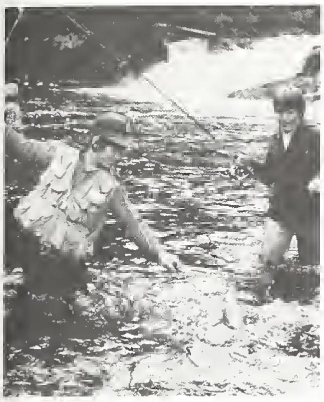
Table 4-51 (continued)
Class I and Class II Stream Buffer Width and Length

VCU	Unit Number	Buffer Width (feet)	Buffer Length (feet)	Alternatives B	C	D	E	F	Reason(s) that Buffer Width Exceeds 100 Feet[1]
246	3500	100-300	2,200	X		X			R, T
	3550	100	3,200	X					
	3551	100	2,600	X					
	3570	100	2,800	X		X			
	3580	100-250	1,300					X	T
	3610	100-500	4,500			X			S
	3720	100-400	3,600	X			X	X	C, NF
	3740	100-700	4,600	X		X		X	NF, R
	3790	100-700	2,600	X		X	X	X	NF, R
	3810	150	100	X		X	X	X	T
	3820	150-200	700	X			X	X	NF
	3860	150-600	2,400	X		X	X	X	NF
	4030	100	1,000	X		X		X	
	4031	100	1,400	X		X		X	
	4110	200	200	X			X	X	T
	4141	100-700	2,300	X		X	X	X	NC, NF, T
	4142	100	1,200	X		X	X	X	
	4160	250-350	300	X			X	X	T
	4200	150-350	3,800	X		X			T
	4201	150-400	2,400	X					T
	4220	100-200	1,300	X		X		X	S
	4260	100	950	X			X	X	
	4261	100-300	1,500	X			X	X	R
	4271	100-600	3,200	X		X	X	X	NF, R
	4280	200	300	X			X	X	R
	4300	200-600	3,000	X		X	X	X	C, NC, NF, S

SOURCE: Lilly 1992.

Note: "X" indicates the unit is included in the alternative.

1 C = Variation of channel location
NC = Nonforest land
NF = Noncommercial forest
R = Riparian soils protection
S = Stand boundary change
T = Topographical influence
W = Provide for windfirmness



Increased access to the Project Area will likely result in increased recreation fishing.

It is not anticipated that habitat capability for the fish MIS would be greatly affected by any of the proposed alternatives which are based on the application of BMPs and 100-foot minimum buffer strips (as prescribed by the TTRA). As displayed in the preceding table, the stream buffer strips are often greater than the 100-foot minimum. This width of the buffer strips often exceeds 100 feet for a such reasons as topographical breaks, riparian protection, timber stand boundaries, nonforest or noncommercial forest land, stream channel location, and to provide windfirmness. See *Mitigation Measures Common to All Action Alternatives* in Chapter 2 for a discussion of the stream buffering that will be done under all action alternatives.

Demand for Fisheries

Demand and competition for fisheries resources is expected to increase as more people enter the area and access is improved. The Project Area is a popular recreational area. Recreation boaters are common with 13 overnight anchorages existing in the Project Area. Five of these anchorages are located at LTFs, providing access for vehicles.

The existing logging camps at Corner Bay and False Island have been occupied since their development. Proposed camps at Crab Bay and Oly Creek could be occupied up to 6 years. This occupation would tend to compete with other users and reduce those fishery resources. Direct effects of camp occupation during road construction and logging include harvest and disturbance of fish. One to 4 camps would be set up, with 40 to 80 people each, depending on the alternative. This number of people with direct access to the fisheries resource would increase the harvest of marine and freshwater species. Competition for species in high demand, such as sockeye salmon, could be intense and could displace traditional users. Some of the logging camps may be near streams where fish would be subjected to higher exploitation than streams farther away. Increased road access would allow sport fishing in previously remote streams and lakes.

Most indirect effects would be associated with increased access created by the road system. Increased use of the roads would attract people who may put more demands on the fisheries resource. Because of the remoteness of the Project Area, however, the increased demand on the fisheries resources would be minor.

Cumulative Effects

Cumulative effects result from actions which, individually, are often minor, but when added together can result in substantial effects. These actions can occur over a long period of time, or can involve a large number of small actions over a short period of time. Up to this point, the discussion has been of individual impacts mostly in the short term. These impacts, however, can affect each other in various combinations over a long time period. Cumulative effects can be more important in those drainages previously entered and may be exacerbated by future roading and logging. Table 4-52 displays cumulative timber harvest by VCU projected through the year 2011. These data can be indirectly related to the potential risk of stream flow changes resulting from proposed timber harvest alternatives. Refer to the *Soils* section of Chapter 4 for an evaluation of cumulative effects from ground disturbance.

Table 4-52

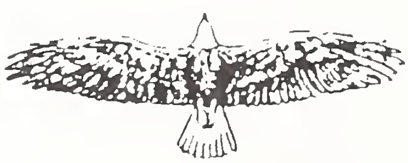
Total Area Harvested Through 2011 (Total Harvest Acres Per VCU/Percent of VCU Harvested)

	Alternative											
	A1/A2		B		C		D		E		F	
VCU	Total Harvest Acres	Percent of VCU	Total Havest Acres	Percent of VCU	Total Harvest Acres	Percent of VCU	Total Harvest Acres	Percent of VCU	Total Harvest Acres	Percent of VCU	Total Harvest Acares	Percent of VCU
230	822	9	1,113	12	1,019	11	1,055	11	1,028	11	1,075	11
231	1,129	6	1,443	8	1,320	7	1,439	8	1,403	7	1,439	8
232	895	8	1,184	11	1,070	10	1,142	10	1,115	10	1,140	10
233	742	7	988	10	900	9	956	9	939	9	936	9
234	575	10	1,009	17	1,006	17	802	14	778	13	917	16
236	2,151	19	2,216	20	2,490	23	2,402	23	2,490	24	2,490	23
239	2,084	12	2,463	15	2,803	17	2,579	15	2,698	16	2,670	16
240	682	7	901	10	819	9	831	9	822	9	873	9
241	845	11	1,058	14	987	14	1,093	15	1,031	14	1,009	4
246	1,310	8	1,611	9	1,571	9	1,606	9	1,557	9	1,555	9
Total	11,235	10	13,986	12	13,985	12	13,905	12	13,861	12	14,103	12

SOURCE: Lilly 1992.

Note: Total percent = Sum of acres/118,176.

As indicated in the previous discussion of watershed harvest effects on stream flow, only VCUs 234, 236, and 239 approach or slightly exceed the 20 percent harvest response threshold through the next two harvest entries in 2011. For VCUs 236 and 239 there is very little difference between cumulative watershed harvest levels in all of the action alternatives. For VCU 234, Alternatives D and E have the lowest potential for affecting stream flows. Although some risk exists for increasing flood flow frequency from cumulative timber harvest in these three watersheds, quantification of streamflow changes and consequences is not possible given the lack of long-term hydrologic data for managed watersheds in Southeast Alaska. As a worst case, increased flood peaks would be expected to be less than 10 percent based on a 40 percent increase in rain on snow flood peaks observed by Harr (1981) in a 100 percent clearcut watershed in the Oregon Cascades.



Wildlife

Information from Chapter 3, *Affected Environment*, provides the basis for evaluating impacts on the various wildlife habitats, wildlife MIS, and biological diversity. The analysis considers the direct, indirect, and cumulative effects from timber management in the Project Area. Effects are projected to the year 2000, the anticipated end of the proposed actions; to the year 2011, halfway through the timber rotation, and end of the long-term timber sale contract; and to the year 2060, the end of the first timber rotation.

Direct and Indirect Effects

Wildlife Habitat

Each action alternative includes the unavoidable harvest of wildlife habitat. Project unit design guides, BMPs (USDA FSH 2509.22), and/or legislated protective measures (TTRA), significantly reduce impacts to beach fringe, estuary fringe, and riparian habitats in each alternative. Alpine/subalpine habitat is also affected very little by road and unit location because of inaccessibility and/or low productivity. Project Area-wide changes in these habitats are 1 percent or less for each alternative (Table 4-53). Impacts to MIS dependent on these habitats are similarly low. Alternatives A1 and A2, the No-Action Alternatives, will have no direct effects on wildlife habitat.

Beach Fringe

There are no acres of beach fringe prepared for harvest in any of the action alternatives.

Streamside Riparian

There are no acres of streamside riparian (TTRA buffers) harvested in any of the action alternatives.

Habitats overlap so the Acres Cut column cannot be added to reflect actual acres planned for harvest by alternative. For example, acres of old-growth timber that occur in the beach fringe or estuary habitats are also counted in the old-growth habitat total, and old-growth stands are part of the general forest habitat total.

Inland Wetlands

There are no inland wetlands proposed for harvest in any of the action alternatives.

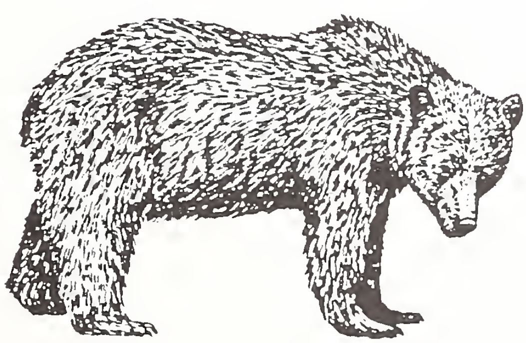


Table 4-53
Wildlife Habitats Proposed for Harvest

		Alternative									
		B		C		D		E		F	
WAA	Habitat	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change
3308	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	0	0	0	0	0	0	0	0	0	0
	Alpine	0	0	26	<1	1	<1	26	<1	26	<1
	Old Growth	0	0	901	5	1,189	8	831	5	742	5
	Forested	0	0	901	4	1,189	6	831	4	742	4
3309	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	0	0	0	0	0	0	0	0	0	0
	Alpine	9	<1	0	0	0	0	9	<1	9	<1
	Old Growth	1,076	14	0	0	646	8	705	9	777	10
	Forested	1,076	8	0	0	646	5	705	5	777	6
3627	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	0	0	0	0	0	0	0	0	0	0
	Alpine	0	0	15	<1	5	<1	15	<1	15	<1
	Old Growth	0	0	339	2	251	2	339	2	339	2
	Forested	0	0	339	2	251	2	339	2	339	2
3628	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	0	0	0	0	0	0	0	0	0	0
	Alpine	0	0	0	0	0	0	0	0	0	0
	Old Growth	0	0	0	0	0	0	0	0	0	0
	Forested	0	0	0	0	0	0	0	0	0	0
3629	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	20	<1	19	<1	0	0	2	<1	6	<1
	Alpine	0	0	0	0	0	0	0	0	0	0
	Old Growth	3,115	8	2,051	5	1,732	4	1,793	4	1,446	4
	Forested	3,115	5	2,051	3	1,732	3	1,793	3	1,446	2
3630	Beach Fringe	0	0	0	0	0	0	0	0	0	0
	Estuary	0	0	0	0	0	0	0	0	0	0
	Alpine	0	0	0	0	0	0	0	0	0	0
	Old Growth	0	0	0	0	0	0	0	0	0	0
	Forested	0	0	0	0	0	0	0	0	0	0

SOURCE: Anderson 1992.

Estuary

Harvest is less than one percent of the total estuary fringe habitat in the Project Area for all alternatives (Table 4-54). Alternative B would harvest 20 acres (<1 percent) throughout the Project Area while Alternatives C, E, and F would harvest even less. The effects to wildlife from harvesting these small amounts of estuary fringe would be negligible.

Forest

Forest habitat includes all areas with forest cover. All acres proposed for timber harvest under the alternatives are necessarily forest habitat as well as old-growth habitat. Table 4-54 shows the changes in forest habitat within Wildlife Analysis Areas (WAAs) by VCU, by alternative. Each alternative would harvest 2 percent or less of the total Project Area forested habitat.

Harvest in estuary fringe habitat areas would be minimal under all alternatives.

Table 4-54
Changes to Forested Habitats Proposed for Harvest

		Alternative									
		B		C		D		E		F	
WAA	VCU	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change
3308	239	0	0	719	5	451	3	614	4	586	4
	240	0	0	0	0	542	8	217	3	0	0
	241	0	0	182	4	196	3	0	0	156	4
3309	246	1,076	8	0	0	646	5	705	5	777	6
3627	236	0	0	339	4	251	3	339	4	339	4
3628	235	0	0	0	0	0	0	0	0	0	0
3629	230	726	10	653	9	305	4	350	5	674	
	231	589	5	443	4	464	4	310	3	0	0
	232	754	9	3	<1	365	5	473	6	0	0
	233	563	7	473	6	322	4	408	5	381	5
	234	483	9	480	9	276	5	252	5	391	7
3630	227	0	0	0	0	0	0	0	0	0	0
Total		4,191	2	3,292	1	3,818	2	3,668	2	3,304	1

SOURCE: Anderson 1992.

Old-growth Forest
Most of the productive forested area in the Project Area is old-growth timber. Any acre scheduled for timber harvest by the alternatives is assumed to be old-growth habitat. Table 4-55 shows changes in old-growth habitat within WAAs, by VCUs, and by alternative. All the alternatives would harvest 3 percent or less of the old-growth forest. All alternatives have identified areas of old growth which would meet the old-growth retention standards in the TLMP. The effects of old-growth habitat loss on old-growth dependent species are reflected in the *Habitat Capability* section. Overall impacts to wildlife from harvesting these areas of old growth in the Project Area would be minor.

Alpine/Subalpine
Proposed timber harvest in alpine habitat is less than 1 percent for each alternative. Alternatives E and F would harvest 50 acres and Alternatives B, C, and D would harvest 9, 41, and 6 acres, respectively (Table 4-53). These levels of harvest would result in negligible effects on wildlife that use the alpine/subalpine habitat.

Table 4-55
Changes to Old-growth Habitats Proposed for Harvest

		Alternative									
		B		C		D		E		F	
WAA	VCU	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change	Acres Cut	% Change
3308	239	0	0	719	7	451	4	614	6	586	6
	240	0	0	0	0	542	11	217	5	0	0
	241	0	0	182	5	196	4	0	0	156	5
3309	246	1,076	14	0	0	646	8	705	9	777	10
3627	236	0	0	339	4	251	4	339	5	339	4
3628	235	0	0	0	0	0	0	0	0	0	0
3629	230	726	15	653	14	305	6	350	7	674	14
	231	589	8	443	6	464	6	310	4	0	0
	232	754	14	3	0	365	7	473	9	0	0
	233	563	11	473	9	322	6	408	8	381	8
	234	483	14	480	13	276	8	252	7	391	11
3630	227	0	0	0	0	0	0	0	0	0	0
Total		4,191	3	3,292	2	3,818	3	3,668	3	3,304	2

SOURCE: Anderson 1992.

Comparison of Alternatives

The pronounced direct effect on wildlife habitats in each action alternative is the loss of old-growth habitat and the change of forest habitat to earlier successional changes. Impacts to other habitats were greatly reduced through unit and road design prior to alternative development. Alternative A2, the No-Action No Further Harvest Alternative, would have no direct effects on wildlife habitats, Alternative A1 would have a minor effect, while Alternative B would have the same direct impact as or greater direct impacts as the other alternatives on each habitat. Alternative D, then Alternative E have the second and third greatest effects, followed by Alternatives F and C. Each alternative would result in direct effects consistent with the amount of timber harvest under implementation of the TLMP and would have negligible or minor impacts overall on wildlife habitats and dependent wildlife.

Habitat Capability

The previous section discusses changes to wildlife habitats used by the MIS. This section discusses how the changes in habitats affect the potential habitat capability for each MIS. As mentioned in the *Affected Environment* section, the models that estimate the capability of habitats to support populations of selected species are not accurate reflections of actual populations in the Project Area. Actual population levels for the MIS are not known at this time. Effects on habitat capability are considered adequate information on which to make a decision regarding alteration of habits, and they indicate a limiting factor for populations.

Existing habitat capabilities for all MIS will be maintained in VCUs 227, 228, 229, 235, 237, 238, 242, 243, 244, and 245 under each action alternative. VCUs 224, 225, and 226 located west of the Project Area in the Tenakee Inlet area, and part of WAA 3630 would also retain current habitat capabilities although they were not included in this analysis. VCUs 247, 248, and 249 (located west of the Project Area in Peril Strait), and part of WAA 3309 maintain current habit capabilities and are not included in the habitat numbers and percentages displayed below. Human development and access could reduce populations of marten and brown bear through increased pressure from hunting and trapping. Human development or access was not considered a major factor in the Project Area because the only community located in the Project Area is temporary in nature and access is not provided for the ferry. Existing roads in the Project Area do not show recent evidence of vehicle use except in WAA 3627, where current logging operations exist.

Several MIS show a habitat/use relationship with the size of preferred habitats. The wildlife models for this analysis do not take into account those patch size relationships. However, they still provide an effective comparison between alternatives. The potential effects of patch size and human developments are included in Appendix G. Direct impacts to brown bear, otter, and bald eagle have been greatly reduced in all action alternatives through avoidance of timber harvest in beach fringe, estuary fringe, stream corridors, riparian, and alpine/subalpine habitats.

Alternative A1 and A2, the No-Action Alternatives, would have no direct effect on habitat capabilities for any MIS.

Sitka Black-tailed Deer

Sitka black-tailed deer are dependent on low-elevation, high-volume, old-growth timber stands during severe winters and are among the MIS most affected by proposed timber harvest under the action alternatives. The Habitat Capability Model information projects that less than a 2 percent reduction in deer numbers may be expected from the proposed timber harvest alternatives. In some alternatives, the potential reduction approaches close to 2 percent. This potential reduction represents a range of 110 to 140 animals in a potential population of 7,412 (Table 4-56).

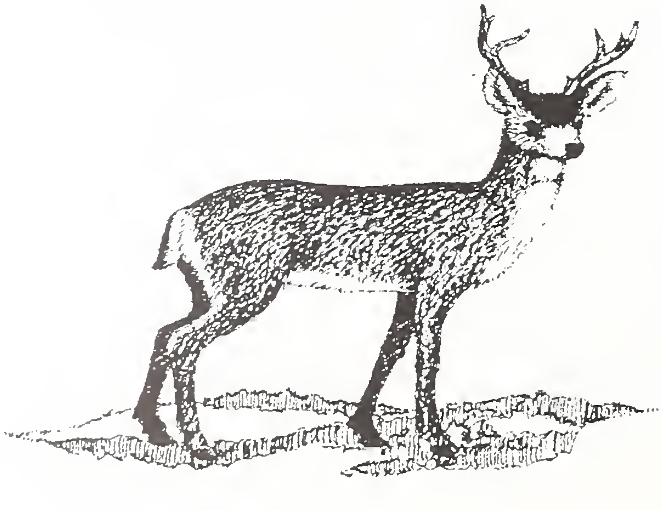


Table 4-56
Projected Reductions of Potential Numbers of Sitka Black-tailed Deer Based on Habitat Capability Model

WAA	VCU[1]	Present Deer Habitat Capability	Alternative A1/A2	B	C	D	E	F
3308	239	427	0	0	30	18	26	24
	240	286	0	0	0	21	7	0
	241	237	0	0	11	10	0	11
Subtotal			0	0	41	49	33	35
3309	246	420	0	33	0	19	18	21
Subtotal			0	33	0	19	18	21
3627	236	372	0	0	12	15	18	12
Subtotal			0	0	12	15	18	12
3629	230	217	0	20	19	8	11	18
	231	398	0	23	16	17	15	0
	232	292	0	29	0	14	20	0
	233	248	0	17	14	9	12	12
	234	149	0	15	15	9	7	12
Subtotal			0	104	64	57	65	42
Total Reduction		7,412	0	137	117	140	134	110
Percent Reduction [2]			0	2	2	2	2	1

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in deer numbers are displayed.
2 Percent reductions are based on population of 7,433 Sitka black-tailed deer.

Brown Bear

Avoidance of beach fringe, estuary fringe, stream corridors, and riparian habitat with timber harvest is reflected in a 2 percent or less decline in brown bear habitat capability for all action alternatives. Alternative D would harvest habitat capable of supporting nine brown bear representing a 2 percent decline in habitat capability. Alternatives B, C, E, and F would decrease habitat capability 2 percent, 1 percent, 1 percent, and 2 percent respectively (Table 4-57). Human disturbance from vehicle access and/or habitation could further reduce habitat capability. These factors would not greatly influence habitat capabilities in the Project Area if logging camps are closed following timber harvest. Indirect effects from logging camps can be mitigated by appropriate refuse disposal and a joint ADF&G and Forest Service information-sharing program for logging camp residents (See Chapter 2 *Mitigation Measures* section).

Brown bear projected populations would decrease by 2 percent or less under all alternatives.

Table 4-57
Projected Reductions of Potential Numbers of Brown Bear Based on Habitat Capability Model

WAA	VCU[1]	Present Brown Bear Habitat Capability	Alternative A1/A2	B	C	D	E	F
3308	239	23	0	0	1	1	1	1
	240	13	0	0	0	1	1	0
Subtotal			0	0	1	2	2	1
3309	246	25	0	2	0	1	1	1
Subtotal			0	2	0	1	1	1
3627	236	16	0	0	1	1	1	1
Subtotal			0	0	1	1	1	1
3629	230	13	0	1	1	1	1	1
	231	18	0	1	1	1	1	0
	232	15	0	1	0	1	1	0
	233	14	0	1	1	1	1	1
	234	8	0	1	1	1	1	1
Subtotal			0	5	4	5	5	3
Total Reduction			0	5	6	9	8	6
Percent Reduction [2]			0	1	2	2	2	1

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in bear numbers are displayed.
2 Percent reduction are based on total project area population of 393 brown bears.

Marten

Marten are an old-growth dependent species that use a wide range of old-growth volume classes, tree species, and landscape positions. All action alternatives would result in a 2 percent or less decline in habitat capability for marten in the Project Area (Tables 4-58) . Alternatives B, C, and D would harvest habitat capable of supporting 8 marten for a 2 percent decline in habitat capability. Alternatives E and F would harvest habitat capable of supporting 7 marten, for a 1 percent decline in habitat capability. Marten are sensitive to over-harvest as a result of road access for trapping. Impacts would be minimal where roads are closed following timber harvest.

Table 4-58

Projected Reductions of Potential Numbers of Marten Based on Habitat Capability Model

WAA	VCU[1]	Present Marten Habitat Capability	Alternative A1/A2	B	C	D	E	F
3308	239	26	0	0	2	1	1	1
	240	14	0	0	0	1	0	0
	241	12	0	0	1	0	0	1
Subtotal			0	0	3	2	1	2
3309	246	30	0	2	0	1	1	1
Subtotal			0	2	0	1	1	1
3627	236	21	0	0	1	1	1	1
Subtotal			0	0	1	1	1	1
3629	230	13	0	1	1	1	1	1
	231	23	0	1	1	1	1	0
	232	16	0	2	0	1	1	0
	233	13	0	1	1	1	1	1
	234	8	0	1	1	0	0	1
Subtotal			0	6	4	4	4	3
Total Reduction			0	8	8	8	7	7
Percent Reduction [2]			0	2	2	2	2	2

SOURCE: Anderson 1992.

1 Only those VCUs that have changes in marten numbers are displayed.

2 Percent reductions are based on total project area populations of 425 martens.

Red Squirrel

Red squirrel is most successful in old-growth spruce stands. Changes in habitat capability under the action alternatives show a not more than 2-percent drop across all action alternatives. Alternative B would harvest habitat capable of supporting 3,320 red squirrels, but this still would only represent a 1 percent change in capability in the Project Area. Alternatives F, C, E and D would decrease habitat capability by 2,590, 2,598, 2,877, and 2,967 respectively (Table 4-59), which represents a 1-percent change in habitat capability.

Table 4-59
Projected Reductions of Potential Numbers of Red Squirrel Based on Habitat Capability Model

WAA	VCU[1]	Present Red Squirrel Habitat Capability	A1/A2	Alternative B	C	D	E	F
3308	239	12,445	0	0	580	325	459	408
	240	7,039	0	0	0	378	160	0
	241	5,695	0	0	230	200	0	230
Subtotal			0	0	810	903	619	638
3309	246	11,147	0	783	0	469	462	549
Subtotal			0	783	0	469	462	549
3627	236	26,845	0	0	254	294	359	254
Subtotal			0	0	254	294	359	254
3629	230	5,962	0	530	483	228	233	495
	231	10,888	0	453	274	303	305	0
	232	7,510	0	591	2	279	365	0
	233	7,265	0	431	348	242	314	309
	234	4,306	0	432	427	249	221	345
Subtotal			0	2,437	1,534	1,301	1,438	1,149
Total Reduction			0	3,220	2,598	2,967	2,878	2,590
Percent Reduction[2]			0	<2	1	1	1	1

SOURCE: Anderson 1992.

1 Only those VCUs that have changes in squirrel numbers are displayed.

2 Percent reductions are based on project area populations of 202,172 red squirrels.

Otter

Otter is another species that benefited from measures taken during unit design that limited timber harvest in beach fringe, estuary fringe, stream corridors, and riparian habitat. All action alternatives decrease habitat capability by 1 percent or less in the Project Area. Alternative D would harvest habitat capable of supporting three otter for a 1 percent decline in habitat capability. Alternatives B, C, E, and F would decrease habitat capability less than 1 percent (Table 4-60).

Table 4-60

Projected Reductions of Potential Number of Otter and Percent Based on Habitat Capability Model

WAA	VCU[1]	Present Otter Habitat Capability	Alternative A1/A2	B	C	D	E	F
3308	240	6	0	0	0	1	0	0
Subtotal			0	0	0	1	0	0
3309	246	9	0	1	0	1	0	0
Subtotal			0	1	0	1	0	0
3627	236	3	0	0	0	0	0	0
Subtotal			0	0	0	0	0	0
3629	231	16	0	0	0	0	1	0
	232	10	0	0	0	1	0	0
	233	7	0	1	1	0	0	0
Subtotal			0	1	1	1	1	0
Total Reduction			0	2	1	3	1	0
Percent Reduction [2]			0	<1	<1	<1	<1	<1

SOURCE: Anderson 1992.

1 Only those VCUs that have changes in otter numbers are displayed.

2 Percent reduction based on Project Area population of 217 otter.

Brown Creeper

Brown creeper are dependent on high volume old-growth timber and, as a result, can be greatly affected by timber harvest. Habitat capabilities decline in the Project Area 2 percent under all action alternatives (Table 4-61).

Table 4-61

Projected Reductions of Potential Number of Brown Creeper and Percent Based on Habitat Capability Model

WAA	VCU[1]	Present Brown Creeper Habitat Capability	A1/A2	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
3308	239	118	0	0	10	5	9	6
	240	51	0	0	0	3	1	0
	241	78	0	0	10	7	0	10
Subtotal			0	0	20	15	10	16
3309	246	29	0	4	0	2	1	2
Subtotal			0	4	0	2	1	2
3627	236	167	0	0	4	10	11	4
Subtotal			0	0	4	10	11	4
3629	230	19	0	1	1	0	1	1
	231	77	0	8	7	7	7	0
	232	62	0	7	0	4	4	0
	233	28	0	2	1	0	1	1
	234	26	0	2	2	1	1	1
Subtotal			0	20	11	12	14	3
Total Reduction			0	24	35	39	36	25
Percent Reduction [2]			0	1	2	2	2	1

SOURCE: Anderson 1992.

1 Only those VCUs that have changesin brown creeper numbers are displayed.

2 Percent reduction based on Project Area population of 1655 brown creepers.

Red-Breasted Sapsucker

The red-breasted sapsucker is able to use lower volume, old-growth stands effectively, so this species may not be as affected by proposed timber harvest as brown creeper or hairy woodpecker. All alternatives would decrease habitat capability 3 percent or less. Alternative B would harvest habitat capable of supporting 747 red-breasted sapsuckers for a 3 percent decline in capability. Alternatives C, D, E, and F would decrease habitat capability by 2 percent (Table 4-62). Snag retention in clearcuts may mitigate some of the impacts from timber harvest (see Chapter 2).

Table 4-62

Projected Reductions of Potential Numbers of Red-Breasted Sapsucker and Percent Based on a Habitat Capability Model

WAA	VCU[1]	Present Red-Breasted Sapsucker Capability	Alternative A1/A2	B	C	D	E	F
3308	239	1,654	0	0	114	69	95	87
	240	970	0	0	0	89	33	0
	241	725	0	0	39	34	039	
Subtotal			0	0	153	192	128	126
3309	246	1,575	0	175	0	106	114	129
Subtotal			0	175	0	106	114	129
3627	236	1,613	0	0	45	49	61	45
Subtotal			0	0	45	49	61	45
3629	230	945	0	143	129	63	66	131
	231	1,455	0	99	67	73	57	0
	232	1,121	0	137	0	70	86	0
	233	955	0	98	87	60	70	70
	234	572	0	95	94	54	48	78
Subtotal			0	572	377	320	327	279
Total Reduction			0	747	575	667	630	579
Percent Reduction[2]			0	3	2	3	3	2

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in red-breasted sapsucker numbers are displayed.
2 Percent reduction based on Project Area population of 25,291 red-breasted sapsuckers.

Hairy Woodpecker

The hairy woodpecker is between brown creeper and red-breasted sapsucker in dependence on high volume old growth. Like red-breasted sapsucker, hairy woodpecker is a primary excavator and is able to effectively use lower volume stands. All action alternatives would reduce habitat capability by 3 percent or less (Tables 4-63). Hairy woodpeckers may also benefit from snag retention in clearcuts as a mitigation for timber harvest (see Chapter 2).

Table 4-63

Projected Reductions of Potential Numbers of Hairy Woodpecker and Percent Based on Habitat Capability Model

WAA	VCU[1]	Present Hairy Woodpecker Capability	Alternative A1/A2	B	C	D	E	F
3308	239	179	0	0	14	10	14	13
	240	95	0	0	0	9	3	0
	241	90	0	0	6	5	0	6
Subtotal			0	0	20	24	17	19
3309	246	98	0	14	0	8	7	8
Subtotal			0	14	0	8	7	8
3627	236	155	0	0	8	10	12	8
Subtotal			0	0	8	10	12	8
3629	230	57	0	8	7	3	4	7
	231	122	0	10	7	7	7	0
	232	91	0	12	0	6	7	0
	233	67	0	7	5	3	5	5
	234	44	0	7	7	4	4	6
Subtotal			0	44	26	23	27	19
Total Reduction			0	58	54	65	63	53
Percent Reduction[2]			0	2	2	3	2	2

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in hairy woodpecker numbers are displayed.
2 Percent reduction based on Project Area population of 2,557 hairy woodpeckers.

Vancouver Canada Goose

The Vancouver Canada goose nests in forested areas in proximity to wetlands and preferred food plants. All alternatives would decrease habitat capability 4 percent or less in the Project Area (Table 4-64). Alternatives E and F would decrease habitat capability 4 percent in the Project Area; Alternative B, 2 percent; Alternative C, 1 percent; and Alternative D, 1 percent.

Table 4-64

Projected Reductions of Potential Numbers of Vancouver Canada Goose and Percent Based on Habitat Capability Model

WAA	VCU[1]	Present Vancouver Canada Goose Capability	Alternative A1/A2	B	C	D	E	F
3308	239	22	0	0	1	1	1	1
	240	22	0	0	0	0	0	0
	241	7	0	0	0	0	0	0
Subtotal			0	0	1	1	1	1
3309	246	74	0	2	1	1	3	4
Subtotal			0	2	1	1	3	4
3627	236	62	0	0	0	0	1	1
Subtotal			0	0	0	0	1	1
3629	230	21	0	2	2	1	4	7
	231	24	0	2	1	1	4	0
	232	19	0	1	0	1	4	0
	233	21	0	2	2	2	4	4
	234	11	0	1	1	1	3	6
Subtotal			0	8	6	6	19	17
Total Reduction			0	10	8	8	24	23
Percent Reduction[2]				0	2	1	1	4

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in Vancouver Canada goose numbers are displayed.
2 Percent reduction based on Project Area population of 662 Vancouver Canada geese.

Bald Eagle

Scheduling of development activities away from beach fringe, estuaries, and Class I and II streams would effectively reduce impacts to bald eagle habitat. Habitat capability decreases by 1 percent under all action alternatives (Tables 4-65 and 4-66).

Management activities within 330 feet of an eagle nest site are restricted by a Memorandum of Understanding (MOU) between the Forest Service and the U.S. Fish and WAA habitat Analysis Area Service (USFWS). Proposed activities within this 330-foot buffer could affect nesting use or success by bald eagles. Possible variances from the MOU with the USFWS regarding 330-foot buffers around eagle nest sites are displayed in Table 4-65. The number of bald eagle nest sites that may be disturbed by management activities is considered a direct effect.

The potential number of variances required could be as many as seven under Alternatives C, E, and F, or as few as eight under Alternatives B and D. Factors that will influence the impacts from variances are timing and duration of disturbance within the buffer zone, presence of an eagle nest, active or inactive status of a nest, and proximity to an existing road or LTF.

The following is a summary of instances where eagle nest trees or their 330-foot radius buffer are impacted or are proposed to be impacted with this project. All proposed harvest units avoid eagle nest trees and their buffer zones.

Habitat capability for bald eagles is reduced by less than 1 percent under all alternatives

Table 4-65
Potential Number of Variances

VCU	Alternatives	No. of Eagle Trees	Location
230	C,E,F	2	Inbetween LTF and camp-site existing facilities, proposed for reconstruction
232	B,D,E	1	7561 road (new construction); field review says tree is down and located in 20- to 30-foot regeneration
233	all	4	7560 road to be reconstructed
241	C,D,F	1	7546 road (existing if 75465 route used)
245	B	3	7566 new road built to False Island

SOURCE: Kosak and Allio 1992.
Note: This information derived from Chatham Area GIS database.

Table 4-66
Projected Reductions of Potential Numbers of Bald Eagle and Percent Based on Habitat Capability Model

WAA	VCU[1]	Present Bald Eagle Capability	Alternative A1/A2	B	C	D	E	F
3308	239	34	0	0	1	0	0	1
	240	18	0	0	0	1	0	0
	241	18	0	0	0	1	0	0
Subtotal			0	0	1	2	0	1
3309	246	25	0	3	0	2	0	1
Subtotal			0	3	0	2	0	1
3627	236	9	0	0	0	0	0	0
Subtotal			0	0	0	0	0	0
3629	230	22	0	0	0	0	0	0
	231	46	0	1	1	1	1	0
	232	28	0	0	0	1	0	0
	233	20	0	1	1	0	1	0
	234	12	0	1	0	0	0	0
Subtotal			0	3	2	2	2	0
Total Reduction			0	6	3	6	2	2
Percent Reduction[2]			0	<1	<1	<1	<1	<1

SOURCE: Anderson 1992.
1 Only those VCUs that have changes in bald eagle numbers are displayed.
2 Percent reduction based on Project Area population of 607 bald eagles.

Biological Diversity

The Project Area would remain a diverse and largely natural environment under all alternatives. Analyses conducted in support of the TLMP Revision indicate that in excess of 560,000 acres of old growth would remain distributed throughout the East Chichagof Ecological Province to support viable populations of MIS. Wildlife habitats within the Project Area will remain well connected by beach and estuary fringe, stream corridors and the myriad of muskegs, steep slopes, and other unscheduled areas. Managed stands would change from multi-aged old-growth timber to even-aged stands of timber in early succession/understory colonization stage.

Large and medium habitat conservation areas (HCA) were identified within the Project Area to maintain sufficient habitat for species which require large tracts of old-growth forest. These tracts of old-growth forest have a high probability of remaining undisturbed. Kadashan VCU 235 was selected as a large HCA, and three medium HCAs (VCUs 237 and 238; portions of VCUs 243, 244 and 245; and VCUs 228 and 229) were selected for all alternatives. The guidelines used to identify these areas are from the strategy for maintaining well distributed population of wildlife associated with large tracts of undisturbed old-growth forests (Suring and Shea 1992).

Effects on diversity would be addressed in terms of successional changes and opportunities for large areas of old growth within the Project Area. Refer to *Plant Community Succession* portion of the *Timber and Other Vegetation* section in this chapter for additional information regarding successional changes. Responses of the MIS to each alternative can be another indicator of changes in diversity. Those changes are discussed in the *Habitat Capability for MIS* section of this chapter.

Alternative A1

Under Alternative A1, 642 acres, would change from old-growth stands to early succession. The shift in successional makeup will occur in VCUs 242 and 243 and will increase between-stand diversity. Several 1,000- to 5,000-acre areas of contiguous undisturbed old-growth timber would remain for the maintenance of natural ecosystem processes and landscape scale WAA habitat Analysis Area species. Previously harvested areas in the Corner Bay areas will have additional time to develop successionally before more timber is harvested.

Alternative A2

Alternative A2 would not change the successional makeup or overall diversity of the Project Area. Several 1,000- to 5,000-acre areas of contiguous undisturbed old-growth timber would remain for the maintenance of natural ecosystem processes and landscape scale WAA habitat Analysis Area species. Watersheds where timber harvest has occurred previously would be allowed to develop successionally.

Alternative B

Under Alternative B, approximately 3 percent of the Project Area, or 4,191 acres, would change from old-growth stands to an early successional stage (seedling/sapling). The shift in successional makeup will occur in VCUs 230, 231, 232, 233, 234, and 246 and will increase between-stand diversity. However, it will not reflect the natural vegetative pattern in the Project Area and may further fragment old-growth habitat. Previously harvested areas in the Corner Bay and Sitkoh Bay areas will have additional time to progress to the next successional stage (closed forest) before more timber is harvested.

Alternative C
Alternative C would result in approximately 2 percent of the Project Area, or 3,292, acres changing to an early successional stage (seedling/sapling). The shift in successional makeup would be in VCUs 230, 231, 233, 234, 236, 239, and 241. Large areas of undisturbed old growth would be preserved in VCUs 227, 228, 229, 232, 235, 237, 240, 242 to 245, and 246.

Alternative D
Alternative D would result in approximately 3 percent, or 3,818, acres of the Project Area changing from old-growth stands to the seedling/sapling successional stage. The shift in successional makeup would be in VCUs 230, 231, 232, 233, 234, 236, 239, 240, 241, and 246. Large areas of undisturbed old growth would be preserved in VCUs 227, 228, 229, 235, 237, and 242 to 245.

Alternative E
Under Alternative E, 3 percent of the Project Area, or 3,668 acres, would shift from old growth to the seedling/sapling successional stage. The change in successional makeup would be fairly well distributed between VCUs 230, 231, 232, 233, 234, 236, 239, 240, and 246. Large areas of undisturbed old growth would be preserved in VCUs 227, 228, 229, 235, 237, 241, and 242 to 245.

Alternative F
Timber harvest in Alternative 5 would change 2 percent, or 3,304, acres of the Project Area from old growth to the seedling/sapling successional stage. This shift in successional makeup would be concentrated in VCUs 230, 233, 234, 236, 239, 241, and 246. Large areas of undisturbed old growth acres would be preserved in VCUs 227, 228, 229, 231, 232, 235, 237, 240, and 242 to 245.

Comparison of Alternatives
Alternative A2 would do the most to preserve the natural biological diversity of the Project Area and maintain natural ecosystem processes. Alternative C would have the least overall impact on biological diversity among the action alternatives and was specifically designed to emphasize biological diversity. Alternatives C and F harvest the least acreage, so habitat capabilities for MIS would decline the least, and several large watersheds would remain undisturbed. The theme of Alternatives D and E is to develop transportation corridors for future entries and has the impact of causing the most disruption to biological diversity by generally spreading the impacts evenly over the Project Area. Alternative B, by concentrating activities in the west end of the Project Area, leaves the east VCUs unaltered in this project.

Consumptive Use of Wildlife

The availability of WAA habitat Analysis Area to meet the demands of hunters and trappers could be affected by the proposed actions. Reductions in habitat capability could decrease availability over time, roads could increase availability through greater access, and the presence of resident camps could increase demand. The principal WAA habitat Analysis Area species sensitive to management activities and over-harvest are Sitka black-tailed deer, brown bear, and marten.

Habitat capabilities for brown bear and marten appear high enough to support current levels of harvest with all alternatives. An average of 14 brown bears were harvested per year between 1987 and 1990 in WAAs in the Project Area (Table 4-67). There would be habitat capable of supporting at least 486 bears with any of the alternatives. The average brown bear harvest is only 3 percent of the estimated habitat capability.

The average harvest of marten was 22 per year between 1987 and 1990 (Table 4-68). There would be habitat capable of supporting at least 578 marten with any of the alternatives. Table 4-68 shows the average marten harvest, the estimated marten population habitat capability based on the habit capability model, and the number of marten needed to support the level of harvest.

Habitat capabilities for Sitka black-tailed deer do not appear high enough to support the average level of harvest from 1987 to 1990 in WAAs 3309, 3629, and 3630 under any of the alternatives. Habitat capabilities even before 1961 probably were not sufficient to support the average harvest in these two WAAs at a level of 10 percent of the population. The 1987 to 1990 average deer harvest is 10.5 percent of the estimated population habitat capability (Table 4-69).

Proposed actions could affect the availability of wildlife for hunting and trapping.

Table 4-67

Estimated Habitat Capability Compared to Numbers of Brown Bear Harvested

WAA	Average Brown Bear Harvest 1987-90	Population Needed to Support Harvest	Alt. A Hab. Cap.	Alt. B Hab. Cap.	Alt. C Hab. Cap.	Alt. D Hab. Cap.	Alt. E Hab. Cap.	Alt. F Hab. Cap.
3308	4.0	100	140	140	139	138	138	139
3309*	2.8	69	57	55	56	56	56	55
3627	1.0	25	42	42	41	41	41	41
3628	1.5	38	51	51	51	51	51	51
3629	4.0	100	131	126	127	126	126	128
3630*	1.0	25	72	72	72	72	72	72
Total		357	493	486	486	484	484	486
Ave.	14.0							

SOURCE: Anderson 1992. (Information from ADF&G Harvest data; Brown Bear Habitat Capability Model.)

Note: Population needed assumes a 4 percent harvest of the population.
* Numbers listed in these WAAs reflect TLMP Revision, Appendix L.

Table 4-68

Estimated Habitat Capability Compared to Numbers of Marten Harvested

WAA	Average Marten Harvest 1987-90	Population Needed to Support Harvest	Alt. A Hab. Cap.	Alt. B Hab. Cap.	Alt. C Hab. Cap.	Alt. D Hab. Cap.	Alt. E Hab. Cap.	Alt. F Hab. Cap.
3308	4.5	6	157	157	154	155	156	155
3309*	1.75	2	100	98	100	99	99	99
3627	12.75	16	49	49	48	48	48	48
3628	0.0	0	59	59	59	59	59	59
3629	1.75	2	121	115	117	117	117	118
3630*	1.0	2	100	100	100	100	100	100
Total		28	586	578	578	578	579	579
Ave.	22.0							

SOURCE: Anderson 1992. (Information from ADF&G Harvest data; Pine Martin Habitat Capability Model.)

Note: Population needed assumes a 200 percent increase in the population winter and fall and a 40 percent harvest of the fall population.
* Numbers listed in these WAAs reflect TLMP Revision, Appendix L.

Table 4-69
Estimated Habitat Capability Compared to Numbers of Sitka Black-tailed Deer Harvested

WAA	Average Deer Harvest 1987-90	Population Needed to Support Harvest	Alt. A Hab. Cap.	Alt. B Hab. Cap.	Alt. C Hab. Cap.	Alt. D Hab. Cap.	Alt. E Hab. Cap.	Alt. F Hab. Cap.
3308	224	2,240	3,160	3,160	3,119	3,111	3,127	3,125
3309*	229	2,290	960	927	960	941	942	939
3627	82	820	899	899	887	884	881	887
3628	39	390	1,093	1,093	1,093	1,093	1,093	1,093
3629	237	2,370	1,798	1,694	1,734	1,741	1,693	1,756
3630*	53	530	527	527	527	527	527	527
Total	864	8,640	8,437	8,300	8,320	8,297	8,263	8,327

SOURCE: Anderson 1992. (Information from ADF&G Harvest data; Sitka black-tailed Deer Habitat Capability Model.)

Note: Population needed assumes a 10 percent harvest of the population.
* Numbers listed in these WAAs reflect TLMP Revision, Appendix L.

Roads constructed in the Southeast Chichagof Project Area will increase access for hunting and trapping. Most of the effects of increased access will take place while logging and road construction camps are operating in the Project Area. Because of the remoteness of the Project Area, camp residents are the only ones likely to have motorized vehicles available to take advantage of the road system. Camp residents would be in a unique position to take advantage of seasonal availability and chance encounters with wildlife. Vehicles transported to the Project Area to support timber harvest activities will be prohibited from use by logging camp residents for hunting, trapping, or fishing. This action will mitigate some of the impacts from the road system.

Tables F-6 to F-11 in Appendix F indicate by alternative which roads will be managed for high-clearance vehicle (HCV) use following timber harvest. The existing road systems proposed for encouragement of HCV use under any alternative are the Corner Bay and Sitkoh Bay road system. Use of HCVs for hunting and trapping will be prohibited if monitoring indicates that unacceptable levels of wildlife harvest occurs because of HCV use.

Roads managed with the objective of accepting or discouraging HCV use are not expected to have significant adverse impacts on wildlife, although the potential depends on the magnitude of use for adverse impacts to some species is substantial. Roads maintained at Maintenance Level I may receive limited ATV use, but only until they become impassable because of alder growth or fallen trees. Potential ATV users from Sitka are more likely to use the road system adjacent to Peril Strait. Potential ATV users from Tenakee Springs are more likely to use the road system from the Crab Bay road system. If monitoring indicates unacceptable impacts to wildlife or other resources from ATV use, then road management objectives, and restrictions will be imposed on their use.

Cumulative Effects

Cumulative effects include past timber harvest, the proposed actions, and timber harvest in the reasonably foreseeable future. The TLMP projects timber harvest through a full 100-year rotation. This portion of the analysis (reasonably foreseeable) will focus on effects to the year 2011, which is half-way through a normal timber rotation. The following assumptions were made for projecting effects to 2011. Approximately the same amount of timber (100 MMBF) must be harvested from the Project Area by the year 2011 to meet contractual obligations, irrespective of levels of timber harvest proposed in the current alternatives (except for Alternatives A1 and A2).

Future impacts to beach fringe, estuary fringe, stream corridors, riparian, and alpine/subalpine habitats will be minimal, similar to those anticipated in the current alternatives.

Future timber harvest decreases the habitat capability for MIS proportional to the total acres of harvested old growth. For example, if harvesting 5,000 acres (using current resource protection measures and economic considerations) yields a decrease of 5 percent for brown bear, another 5,000 acres cut before 2011 would probably yield a similar decrease.

Wildlife Habitats

The effect common to all alternatives is that the Project Area will be further harvested to fully implement the TLMP and meet timber sale contractual obligations. In excess of 81 percent of the old-growth forest that existed in 1960 would remain in the Project Area under all action alternatives through the year 2011 (Table 4-70). Twenty nine percent of the old-growth acres remaining under all alternatives, or approximately 39,342 acres, will be retained through this planning effort as needed to meet old growth habitat condition (see Table 3-24). TLMP incorporated retention factors which were used to calculate the percent reduction from maximum timber yields that would be expected from management constraints for protection of wildlife, fisheries, and visual resources.

Cumulative impacts through 2011 vary little in total acres harvested between action alternatives (Table 4-70). Alternative C would have the most impact through 2000 but have little additional effect between 2000 and 2011. Alternatives B, D, E, and F distribute the impact of habitat loss more evenly over the Project Area.

Table 4-70

Cumulative Acres and Percent of WAA habitat Analysis Area Habitats Harvested Through Year 2011

Habitat	Acres cut pre-1992	Alternative A1/A2 Acres Cut	A1/A2 Cum. %	B Acres Cut	B Cum. %	C Acres Cut	C Cum. %
Beach Fringe	1,255	0	13	0	13	0	13
Estuary Fringe	848	0	9	40	10	38	10
Stream/Rip	1,829	0	14	0	14	0	14
Forest	20,546	25,575	11	29,339	13	28,616	13
Old Growth	20,546	25,575	16	29,339	19	28,616	18
Alpine	903	0	1	18	1	82	1

Habitat	Acres cut pre-1992	Alternative D Acres Cut	D Cum. %	E Acres Cut	E Cum. %	F Acres Cut	F Cum. %
Beach Fringe	1,255	0	13	0	13	0	13
Estuary Fringe	848	0	9	0	9	38	9
Stream/Rip	1,829	0	14	0	14	0	14
Forest	20,546	25,259	11	28,935	13	29,175	13
Old Growth	20,546	25,259	19	28,935	19	29,175	19
Alpine	903	0	1	100	1	100	1

SOURCE: Anderson 1992.

Note: Habitats overlap so ACres Cut column cannot be added to reflect actual acres planned for harvest by alternative. For example, acres of old-growth timber that occur in thebeach fringe or riparian habitats are also counted in the old-growth habitat total, and old growth is part of the general forest.

Habitat Capability for MIS

Decreases in habitat capabilities projected to the end of the long-term timber sale contract in 2011 are similar for all action alternatives. Effects projected from the year 2000 to 2011 for each MIS were based on the average change in habitat capability anticipated under all current alternatives between 1990 and 2000. This took into account the more stringent resource protective measures currently used to design harvest units (compared to those measures used on earlier entries) and enabled projection of effects without knowledge of exact locations of future harvest units.

Projected timber harvest to the year 2011 would result in habitat capability decreases within a 1 to 4 percent range difference between alternatives (Table 4-71). Alternative B would produce most of the anticipated declines between the year 1990 and 2000. Alternatives D, E, and F would more evenly distribute the decrease in habitat capabilities between the years 1990 to 2000 and 2000 to 2011 entries. Alternative C would result in smaller decrease in habitat capabilities between the years 1990 to 2000 than between the years 2000 to 2011. Gradual changes in habitat capability may avert degradation of remaining habitat from overuse by displaced wildlife.

Table 4-71
Cumulative Change in Habitat Capability Between Years 1961 and 2011 (in percent)

		Alternative											
		A1A2		B		C		D		E		F	
Species	Habitat Cap. in 1961	Change to 2000	Change to 2011	Change to 2000	Change to 2011	Change to 2000	Change to 2011	Change to 2000	Change to 2011	Change to 2000	Change to 2011	Change to 2000	Change to 2011
Sitka Black-tailed Deer	8,737	15	15	17	19	17	18	17	19	17	19	16	17
Brown Bear	419	2	2	3	6	4	6	4	6	4	6	3	6
Red Squirrel	202,172	5	5	7	8	6	7	6	7	6	7	6	7
Otter	269	18	18	19	20	19	20	19	20	19	20	18	18
Marten	479	13	13	15	17	15	17	15	17	15	17	15	17
Brown Creeper	4,321	63	63	64	65	65	66	65	66	65	66	64	65
Red-breasted Sapsucker	27,516	8	8	11	14	10	12	11	13	10	12	10	12
Hairy Woodpecker	3,458	26	26	28	30	28	30	29	31	28	30	28	30
Vancouver Canada Goose	579	7	7	9	11	8	9	8	9	11	15	11	15
Bald Eagle	760	18	18	19	20	19	20	19	20	19	20	19	20

SOURCE: Anderson 1992.

Decrease in habitat capability to 2000 for Alternative A/1/A2 reflects only past timber harvest.

Biological Diversity

Approximately 84 percent of the old-growth acres will remain under all action alternatives, and additional acres will be harvested by the year 2011. The East Chichagof Ecological Province will have additional areas of undisturbed old growth in the LUD II VCUs outside the Project Area. Habitats should retain connectivity under guidelines for uncut beach fringe, estuary fringe, stream corridors, and unscheduled areas. MIS capabilities will remain well distributed throughout the Project Area although at reduced levels as a result of the anticipated timber harvest. The natural old-growth dominated landscape will shift towards a mosaic of young timber stands.

All action alternatives would result in approximately the same proportion of successional stages by 2011. Approximately 10 percent of the Project Area would change to earlier successional stages (refer to *Plant Community Succession, Timber and Other Vegetation* in this chapter).

The alternatives vary primarily in the time frame in reaching those proportions. Gradual successional changes would allow wildlife populations time to adapt to change in vegetation and possibly avoid over-competition and habitat degradation resulting from the temporary overpopulation before populations reach equilibrium with habitat capability. Alternatives C, D, E, and F will all provide for a gradual successional change to the year 2011.

Long-term Productivity

Primary long-term impacts on wildlife result from loss of old-growth habitat. By 2060, the end of the first timber rotation, 37,000 acres or 27 percent of the speculated old growth in the Project Area will have been harvested if TLMP is implemented. Species such as Sitka black-tailed deer, brown creeper, hairy woodpecker, red-breasted sapsucker, and marten depend on old growth at critical times of the year and will experience decreases in habitat at critical times of the year. Brown bear, otter, and bald eagle would experience much smaller decreases in habitat capability because of protection of beach fringe, estuary fringe, and riparian habitat. All MIS are expected to be above minimum viable levels within the Ecological Province and their occurrences are anticipated to remain well distributed throughout the Project Area.

These projections of habitat capability are based on current resource protective measures and changes in habitat capabilities resulting from timber harvest planned in Alternatives B through F. The projected capabilities for brown bear and marten could decrease further if roads are left open and/or logging camps become long-term facilities. This could result in human-related disturbance and mortality.

Canopy closure in second-growth stands at about 20 years results in reduced habitat capability for deer, marten, and brown bear but increased capability for red squirrel. This factor was included in the projections to the year 2060 for deer. The changes would be small for the other species. Thinning second-growth stands may delay or set back canopy closure to offset the negative effects of maturing second-growth stands on wildlife because of limited research and experience.

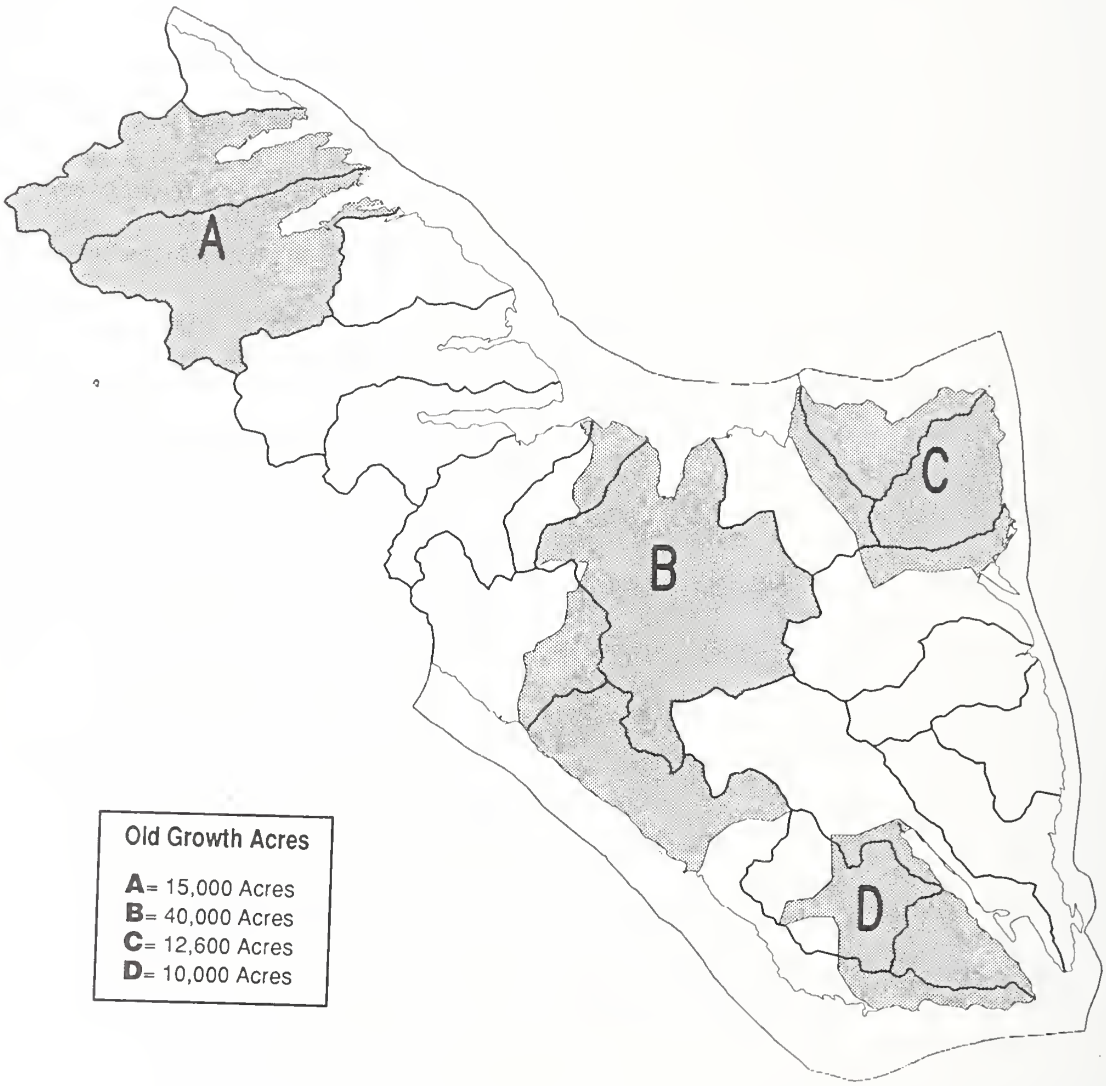
Habitat Conservation Areas

Habitat conservation areas are delineated areas of old-growth forest habitat. These areas are close enough together across the landscape to allow local populations of species of concern (e.g., brown bear, marten) occupying each tract to adequately interact with nearby populations (Figure 4-2). These tracts of land range in size from 10,000 to 40,000 acres in the Project Area. Habitat conservation areas provide for the interchange of genetic material and provide for recolonization of vacant habitats (from occupied habitats). This is essential to maintain species viability and distribution. The intent of habitat conservation areas is to minimally ensure continued distribution of certain species over most of their current range.

Threatened and Endangered Species

Proposed actions in each of the alternatives are not anticipated to adversely affect directly, indirectly, or cumulatively the endangered humpback whale, American peregrine falcon, Aleutian Canada goose, and Eskimo curlew, and the threatened Steller sea lion and Arctic peregrine falcon in the Southeast Chichagof Project Area. None of the eight species listed as sensitive by the Alaska Region of the Forest Servive are known to occur in the Project Area. The Category 2 candidate species are not expected to be significantly affected. For more information, see the Biological Assessment in Appendix F.

Figure 4-2
Habitat Conservation Areas



SOURCE: Chatham Area GIS.

Cultural

Cultural resources found within the boundaries of the Southeast Chichagof Project Area are an important resource which may contain information about both environmental conditions and the lifestyle of former inhabitants of the area. This information may be applied to both the environmental and cultural history of the northern Pacific Rim area and perhaps the interior of North America as well. Impacts to cultural resources can include alterations to the setting of sites, alterations of aboveground objects, features and structures (as well as spatial relationships among them), and disturbance of subsurface cultural deposits. Cultural resources are a finite and nonrenewable resource.

Because of the large size of the Southeast Chichagof Project Area, the Forest Service has determined that creating an inventory of cultural resources for the entire project area would be too costly and impractical. As a result, in consultation with the State Historic Preservation Officer (SHPO), the Forest Service has developed a survey design which is applied to all project impacts areas in the cultural High Probability Zone for all alternatives plus an additional agreed-upon percentage of the cultural High Probability Zone. This survey design provides a planned outline for conducting complete archaeological surveys in certain prescribed areas of the Southeast Chichagof Project Area.

A complete survey consists of a systematic pedestrian survey of an area, including intensive soil probing at previously determined intervals and supplemental shovel testing as deemed necessary by the supervisory archaeologist. A variety of characteristics have been considered in designing where the surveys will be conducted, such as known previous land-use patterns, eustacy (changes in sea level) and isostacy (rebounding of the earth's crust), an assorted variety of landform configurations, the percent of slope, elevation, and numerous other factors. The information has been generated on the GIS and a series of overlays produced from which the analysis is being conducted to identify those areas to be surveyed.

A similar survey design was created for the 1991 Kelp Bay Project Area (Davis et al. 1991), and much of the current survey design is based on that document and the Draft Regional Research Design/Predictive Model for Region 10 (Autrey and Harris 1982). The basic survey design model used by the Chatham Area has naturally undergone an evolutionary process. Perhaps the most significant change from the Kelp Bay survey design to this model is the change in probability zones. The Southeast Chichagof survey design deviates from the traditional three-part scheme by eliminating the Medium Probability Zone. The result of this change is an enlargement of both the High and Low Probability Zones. Table 4-72 illustrates the evolutionary development of the probability zones.

Under the Kelp Bay Project, the High Probability Zone consisted of elevations from 0 to 150 feet and all slopes less than 35 percent. As the process of refinement continues, the model for the Southeast Chichagof Project has been altered to test a High Probability Zone 0 to 100 feet, regardless of the slope and areas so designated by resources queried through GIS (i.e., mineral zones).

Table 4-72
Cultural Probability Zone

Probability Zone	R-10 Supplement to the F.S.Manual 2300s (1989)	Kelp Bay Project Area	Southeast Chichagof Project Area
High	Sea level to 100-foot elevations	Sea level to 150-foot elevations	Sea level to 100-foot elevations plus areas so designated by GIS
Medium	100-1000 feet with slopes <30%	150-300 feet with slopes <35%	0
Low	100-1000 feet with slopes >30% and all elevations >1000 feet	All elevations > 300 feet	All elevations > 100 feet

SOURCE: Iwamoto 1992b.

The Low Probability Zone for the model for the Project Area is for elevations from 100 feet and above with no consideration of slope. The reasoning behind this change is to test the theory that there is a strong likelihood that cultural resources either are found within a prescribed boundary zone or they are not. This is not to be taken as an absolute since many settlement and resource use patterns still have not been clearly and concisely identified. In testing this model which uses only High and Low Probability Zones, it is anticipated that the probability zones for each particular resource type can be more closely identified and refined.

The probability zones should not be considered entirely static in that some resources, such as mining and culturally modified trees (CMTs), will be located in the High Probability Zone, which falls outside the 0- to 100-foot-high designation. Sites identified with the mining industry are often located in elevations well above 200 feet. In these instances, the High Probability for mining would be adjusted to consider past known resources. The result would be identified "pockets" of High Probability within the Low Probability Zone. Likewise, it is known that CMTs have been identified above the 200-foot level. However, the inventory of this resource to date has identified the heaviest concentrations within the first 200 feet of elevation. The Chatham Area is collecting data on CMTs which will be entered into a database that will be used to assist in predicting where CMTs are expected to occur.

A brief examination of the previously defined probability zones will clarify the reasoning for altering the probability zones for this survey design. Beginning with the SEIS, the research design (Forest Service 1989b) dropped all remaining surveys within the Low Probability Zone because of the fact that a large amount of time and energy was being spent on surveys which were resulting in negative findings. No new cultural resources were identified. Likewise, only a specified percentage of the Medium Probability Zone was to be surveyed because of the fact that only CMTs had been previously identified within this zone. The Kelp Bay survey design readjusted the probability zones and, again, no surveys were conducted within the Low Probability Zone, and only 20 percent of the cutting units and associated roads were surveyed in the Medium Probability Zone.

With several years accumulation of data acquired concerning the identification and location of sites within these prescribed probability zones, it has become apparent that with the exception of sites associated with the mining industry and CMTs, to date the greatest number of sites are located within the High Probability Zone. Therefore, the Southeast Chichagof Survey Design proposes to 1) eliminate the Medium Probability Zone entirely, and 2) identify the Low Probability Zone as all terrain above 100 feet in elevation. No complete surveys are proposed for the Low Probability Zone; however, intense monitoring of all roads which have already been constructed and are located within the Low Probability Zone will be completed. In addition to these previously constructed roads, roads located in the Low Probability Zone will be monitored after construction. Intensive coverage is recommended in all alternatives for those activities which fall into the High Probability Zone.

Upon completion of the prescribed surveys, all sites identified will be evaluated. In accordance with 36 CFR Part 60, the criteria for evaluation for the significance of a property for listing on the National Register of Historic Places will be applied. For those properties found eligible for the National Register, a Determination of Effect will be made as directed in 36 CFR Part 800. Mitigation measures will be outlined in the Determinations of Effect where required, with avoidance being the preferred mitigation plan. All cultural resources work will be completed prior to the beginning of the timber harvesting and any associated activities.

Direct and Indirect Effects

Alternatives A1 and A2, the No-Action Alternatives, would result in no further effects on cultural resources from the APC long-term timber sale activities. Under Alternative A1, logging activities which are proposed only in those VCUs which are shared in common with both the SEIS Project Area and the Southeast Chichagof Project Area would continue. Under Alternative A2, SEIS activities would be discontinued. No new additional logging activities would be initiated within the Southeast Chichagof Project Area. In regards to the SEIS, the "Section 106 Process," as outlined in the National Historic Preservation Act of 1966 (as amended), has been completed. The research design was written by the Forest Service, then amended for the 1990 field season, and concurred with at both stages by the SHPO (Davis et al. 1990; Forest Service 1990b; SHPO 1990). The designated surveys have been completed and the final report submitted to SHPO (Lively 1991). The Determinations of Effect have also been included. It is not anticipated that any further archaeological sites will be located during the timber harvest activities within the SEIS area. However, should any sites be uncovered during these activities, work will be stopped and the Forest Archaeologist notified immediately.

The remaining action alternatives under consideration for the Southeast Chichagof Project Area are not expected to differ in their impacts on cultural resources. Before logging activities are undertaken, the Forest Service cultural resource specialists will apply the survey design to inventory and will identify currently undiscovered cultural resources, evaluate their significance, determine potential project impacts, and design and implement necessary mitigation measures. Such measures could include relocating or redesigning some timber management activities to avoid disturbing cultural resources, as well as providing protection of sites through the use of barriers and ensuring recovery of scientific data or otherwise documenting sites that cannot be avoided or protected. Mitigation measures would be designed to eliminate adverse project effects on significant cultural resources and would be set into enforceable contract provisions.

Cultural resources are considered unique since they are a nonrenewable resource and have therefore encountered a unique aspect in the contractual agreement between APC and the Forest Service. As stated in Protection of Cultural Resources, Section 7n of the contract (pages 31-32):

> The contract might be modified by the Forest Service to protect cultural resources which may be discovered during the course of the purchaser's (APC) operations. In the event that any cultural resource is identified, both parties shall be notified immediately. The purchaser shall protect all cultural resources against destruction, obliteration, removal, or damage during the operating period.

Cumulative Effects

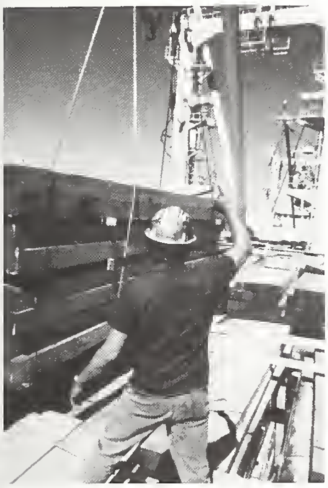
Impacts from natural decay, landscape changes, private developments, and timber management activities have combined to disturb a portion of the cultural resources of Southeast Alaska. Development activities of all kinds pose particular threats to cultural resources because such activities tend to be located in the same places that cultural resources are found (such as sheltered coastal settings).

It is impossible to determine the exact nature of resources that have been disturbed in the Southeast Chichagof Project Area. Mitigation measures have only been implemented during recent years. Future timber management activities could combine with natural events to result in continued disturbance of cultural resources. The implementation of various mitigation measures would reduce this disturbance by preserving significant sites and providing data on those sites that cannot be preserved.

Economic and Social

Direct and Indirect Effects

The economic consequences of the Southeast Chichagof Project Area alternatives can be evaluated in a number of ways. From a strictly financial perspective, the value of the standing timber is equivalent to its "stumpage value," or the amount of compensation the Forest Service receives when the timber is harvested. In addition to returns to the U.S. Treasury, stumpage values indirectly affect fiscal conditions in local communities through payments to the State. The concept of present net value (PNV) can be useful to analyze timber harvest activities from an investment perspective and capture benefits and costs that are realized over a period of time. The benefits of future harvest revenues are offset by their costs and combined with the costs and revenues of the initial harvest to arrive at a PNV for each alternative. From a social welfare perspective, the volume of timber available for harvest under each alternative supports a different level of job opportunities in timber-related industries. A more detailed analysis of these important economic indicators is included in the following discussion.



An economic cost/benefit analysis of timber harvest is required for the Southeast Chichagof Project.

Economics of Timber Harvest

The current Forest Service Handbook direction (USDA FSH 2409.18) requires an economic efficiency assessment to compare benefits and costs of proposed timber sale projects (mid-market assessment) to determine if the sale would be an economic offering. For the Southeast Chichagof Project, this assessment was conducted by subtracting estimated logging and transportation costs (including road construction) from the pond log value for each action alternative. Pond log values represent the market value for wood products net of the average manufacturing cost for those products. In order to account for market fluctuations, the weighted average of quarterly pond log values from 1979 through 1991 was used in the analysis. An allowance of 60 percent of normal profit and risk also was included as a cost and subtracted from pond log values per USDA FSH 2409.18. The assessment, therefore, provided estimates of the value of the timber that would accrue under average market conditions. Stumpage values would be higher under better-than-average market conditions and lower under less robust circumstances.

The results of the midmarket assessment and relative ranking of each alternative are displayed in Table 4-73. It is important to recognize that these values represent very preliminary approximations. Prior to the time the timber is made available to APC, a timber cruise and appraisal will be conducted using current selling values, costs, and normal (100%) profit and risk to determine the volume and value of timber made available for harvest.

Table 4-73

Economic (Midmarket) Assessment of Timber Harvest (in Dollars per MBF)

	Alternatives					
	A1/A2	B	C	D	E	F
Volume (MBF)	0	137,420	111,000	132,040	125,560	104,490
Pond Log Value	0	306	325	328	318	326
Stump to Truck Costs[1]	0	109	133	121	127	130
Transportation Cost [2]	0	67	41	51	41	39
Administration Cost [3]	0	5	5	5	5	5
Temporary Development [4]	0	17	11	11	14	15
Subtotal Logging Costs	0	198	190	189	187	189
Specified Road Costs [5]	0	72	43	77	75	66
Total Harvest Costs	0	270	233	266	263	256
Profit & Risk Margin	0	47	48	46	47	47
Net Stumpage Value [6]	0	(10)	44	15	9	23
Relative Ranking	Null	5	1	3	4	2

SOURCE: Lilly 1992.

1 Includes falling, bucking, yarding, sorting, and loading costs.
2 Includes road haul, dump, raft, water tow and road maintenance costs.
3 Includes logging operations and overhead costs.
4 Includes temporary road and camp mobilization costs.
5 Includes specified road construction and reconstruction, and LTF construction costs.
6 Net Stumpage = Pond log value less total harvest costs less profit and risk
( ) Negative values.

Variances in volume per-acre, species mix, logging systems, log-haul distance, road construction and reconstruction costs, camp mobilization costs, and profit and risk allowances affect both the pond log values for each alternative and logging and transportation costs. Costs and revenues used in the assessment represent averages for each alternative. Although individual units may not be economical to harvest by themselves, the management of less productive lands or lands containing a high percentage of defective timber will help to increase future timber yields. The harvest of units with higher returns will help compensate for those that are less economical.

Based on this preliminary analysis, Alternatives C, D, E, and F would result in positive average stumpage values at a mid-market level and would be considered economic offerings.

The negative stumpage value indicated for Alternative B could result in either establishment of ineffective purchaser credit to be applied to other offerings, or in the use of appropriated dollars to augment purchaser credits for road construction.

The major factors affecting net stumpage values among the action alternatives are transportation costs (hauling) and the cost of specified roads. Alternatives with longer average haul distances and more miles of road construction yield the lowest net stumpage values. Alternatives that concentrate harvest in VCUs with existing road systems propose shorter haul distances and require less road construction as well as yield higher net stumpage values. There is a direct relationship between the extent of helicopter yarding proposed for an alternative and increases in stump-to-truck costs. The cost increases, however, are more than offset by lower costs for hauling and road construction costs. It is interesting to note that although Alternative B has the lowest stump to truck costs, it still results in the lowest net stumpage value, primarily because of the considerable road construction and haul costs involved.

Investment Analysis

Preliminary estimates of the costs of planning, sale preparation, harvest administration, reforestation, and timber stand improvement indicate that costs will exceed timber sale receipts for all alternatives. The net returns for harvesting established stands, however, can be considerably less than those expected for future rotations. A large part of the costs incurred today are investments that will reduce the expense of harvest in the future. Cost and revenue projections have been summarized into a PNV for each of the alternatives to evaluate the effect of the proposed timber harvest on the overall financial efficiency of the timber program. Costs (and revenues) incurred in the future are discounted back to the present to capture the time value of money. The present net value of harvesting established stands as well as future rotations is displayed in Table 4-74. Primarily because of the large up-front investment in road construction, the PNV of stumpage from established stands is negative for all alternatives. The investments made today establish a road network for future harvests and result in a much brighter financial picture in latter years. As shown in Table 4-74, the value of future rotations is positive under all alternatives.

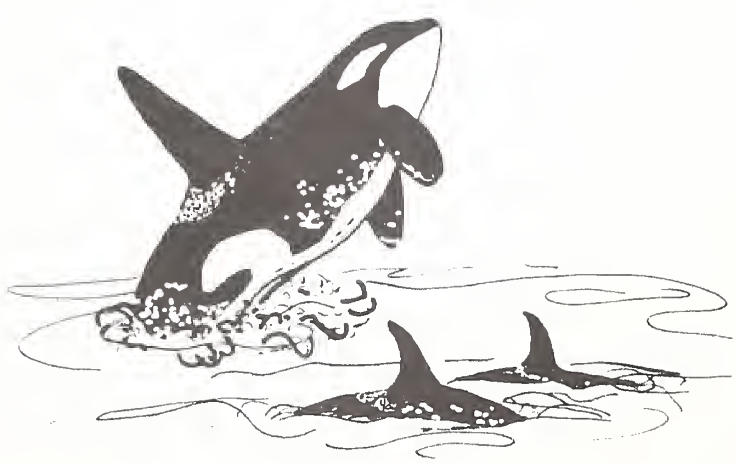


Table 4-74
Comparison of Present Net Value (PNV) (in million of dollars)

	Alternative B	C	D	E	F
Established Stands					
Stumpage Receipts	-1.37	4.88	1.98	1.13	2.40
Forest Service Costs	6.96	5.46	6.34	6.09	5.48
Net Value	-8.33	-0.58	-4.36	-4.96	-3.06
Future Rotations					
Stumpage Receipts	12.02	9.31	10.71	10.81	9.81
Forest Service Costs	6.96	5.46	6.34	6.09	5.48
Net Value at Time of Harvest	5.06	3.85	4.37	4.72	4.33
PNV Calculations					
Present Net Value of Future Rotation	0.10	0.07	0.09	0.09	0.08
Present Net Value of Alternative	-8.23	-0.51	-4.27	-4.87	-3.00

SOURCE: Morse 1992.

Regional Employment and Income Effects

The Tongass timber program is part of a long-term cooperative effort among the Federal government, the State of Alaska, and local governments to provide greater economic diversity, and stable employment opportunities in Southeast Alaska. The APC's 50-year timber sale contract helped to guarantee the supply of raw materials necessary to attract new industry to Southeast Alaska at a time when the region's economic base was quickly eroding.

> During the 1940s the region's economic base was all but wiped out. Gold mining was terminated in 1942. After decades of serious over exploitation, the salmon resource crashed—average annual salmon harvests declined from 31 million fish in 1945-49 to 19 million fish in 1950-1976 and bottomed out at 8 million fish for 1977-79.
>
> The creation of the new forest products industry in 1954, therefore, was something of a rescue mission for the region's economy. The provisions of the 50-year contracts guaranteeing timber supply were essential to induce the substantial private investment required. The initial investments were made for increasing capacity and modifying the processes. This made it the largest private investment in Alaska since the Morgan-Guggenhiem investment in copper and a railroad in the first decade of the century. (Rogers 1989)

Because timber harvested on Forest Service land is subject to a primary manufacturing requirement, most of the jobs provided by the pulp mills and sawmills in the region are linked to timber supplies from the Tongass. Maintaining timber supply opportunities for the region's timber industry was an important objective of the TLMP and ANILCA. To a large extent the employment objective has been achieved. In comparison with fiscal year (FY) 1981, employment in logging, lumber and pulp production in Southeast Alaska was 30 percent greater during FY 1990 (ANILCA 706(a) Report to Congress, Region 10).

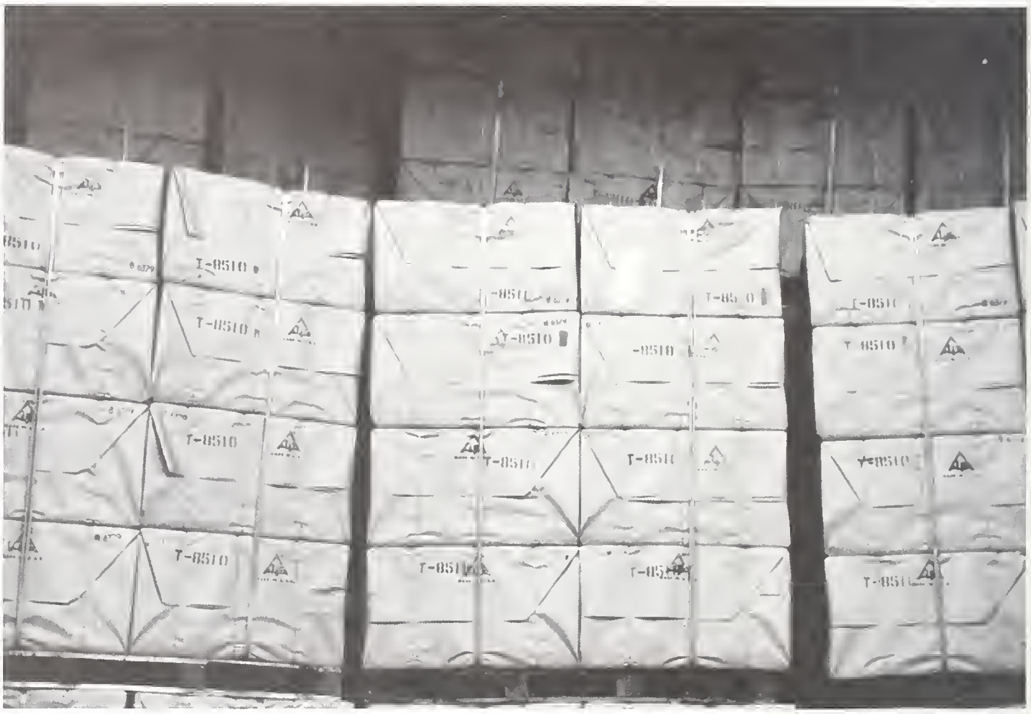
Clearly, a constant supply of National Forest timber alone cannot ensure the maintenance of ANILCA's timber employment objectives. Other controlling factors include worker productivity, interest rates, production and shipping costs, regional competition, private and public harvest levels, foreign exchange rates, and the overall Pacific Rim demand for wood fiber.

The Forest Service economic model, IMPLAN, was used to provide estimates of the employment and income supported by timber harvest alternatives within the Southeast Chichagof Project Area. The total economic effect of any alternative is a combination of 1) primary or direct effects, and 2) secondary or indirect effects. Direct effects arise from the export of products outside Southeast Alaska. Indirect effects encompass the chain of consequences that result from the direct effects. For example, sawmills require electricity, mechanical components, and miscellaneous supplies to meet the demand for lumber. Some of these necessities will be purchased locally. An additional stimulus occurs when the wages and salaries form the direct and indirect employment effects are spent inside the region. The input-output model captures all these rounds of spending and summarizes the employment and income generated as a result.

Many assumptions and limitations are inherent in any model serving as a proxy for the actual economic structure of a region. The primary assumptions of an input-output model such as IMPLAN are that the production function of local industries remains constant over time, and that the basic "recipe" of inputs is analogous to that observed at a national scale. Because the ratio of employment to output is held constant, employment effects can be derived from estimates of changes in total industry output. This has important implications for analyses of the wood products industry because increased mill efficiency in recent years has reduced the share of labor as a production input. The IMPLAN model was adjusted to incorporate employment and output information more representative of the current industry structure.

The predictive capabilities of the IMPLAN model are based on linear relationships. Regardless of the size or direction of change in timber harvest levels, the regional economy is expected to respond in a strictly proportional manner. In reality, this straight-line relationship may not hold, and some industries may be forced to shut down completely if production is significantly reduced. The extensive capital investment in a pulp mill represents a fixed cost that cannot be altered in the short term. Therefore, to remain economically viable, the plant must run continuously. Conversely, if large increases in demand occur, an industry may expand operations with additional capital investment and a disproportionate increase in employment. Therefore, the estimates of employment and income derived from IMPLAN must be interpreted with regard to the scale and operating capacity of industries within Southeast Alaska.

Bales of pulp ready for shipment



As a result of the complexity of the transportation network required for timber harvest and the number of processing options for Tongass timber, a variety of industries comprise what is commonly referred to as the "wood products industry." For purposes of this analysis, a distinction is made between employment attributed to conducting the proposed action (i.e. timber harvest), and the employment supported by further processing of that timber into lumber, cants, and pulp. The distinction is important in terms of the timing of employment opportunities and the availability of other sources of fiber. For several reasons, the consequences of the proposed action are more directly reflected in the employment figures corresponding to timber harvest activities rather than those of the processing industries. Although the Southeast Chichagof Project area is one source of supply for the mills, a number of previously mentioned factors serve to influence the amount of pulp and lumber produced as well as the potential of additional fiber supplies. Finally, the employment figures reported here represent a portion of the current workforce rather than an absolute increase (or decrease) in employment. Consequently, they are most appropriately used as a basis for comparison between alternatives.

Table 4-75 lists the results of the IMPLAN model analysis for each alternative. Employment and income effects for timber harvesting activities are based on the detailed estimates of logging and road construction costs used in the economic assessment previously discussed. Historical trends were examined to determine the percentage of stumpage volume to allocate between pulp and lumber production to estimate the employment and income effects associated with timber processing. Personal income estimates are based on average industry wages as reported by the timber industry and the Alaska Department of Labor. These site-specific data were incorporated into the IMPLAN model to calculate the total effect of increased timber-related output in the construction, logging, marine transportation, sawmill, and pulp mill industries within Southeast Alaska.

Table 4-75
Employment and Income Effects

	Alternative B Employ.	B Income	C Employ.	C Income	D Employ.	D Income	E Employ.	E Income	F Employ.	F Income
Timber Harvesting Construction	92	3.57	43	1.67	85	3.30	80	3.09	60	2.33
Logging	369	12.69	300	10.31	357	12.27	329	11.29	278	9.55
Marine Transportation	11	0.33	11	0.33	10	0.30	12	0.35	10	0.30
Timber Processing Sawmills	225	8.18	182	6.62	217	7.87	206	7.48	172	6.23
Pulp Mills	348	15.02	281	12.14	335	14.44	318	13.73	265	11.43

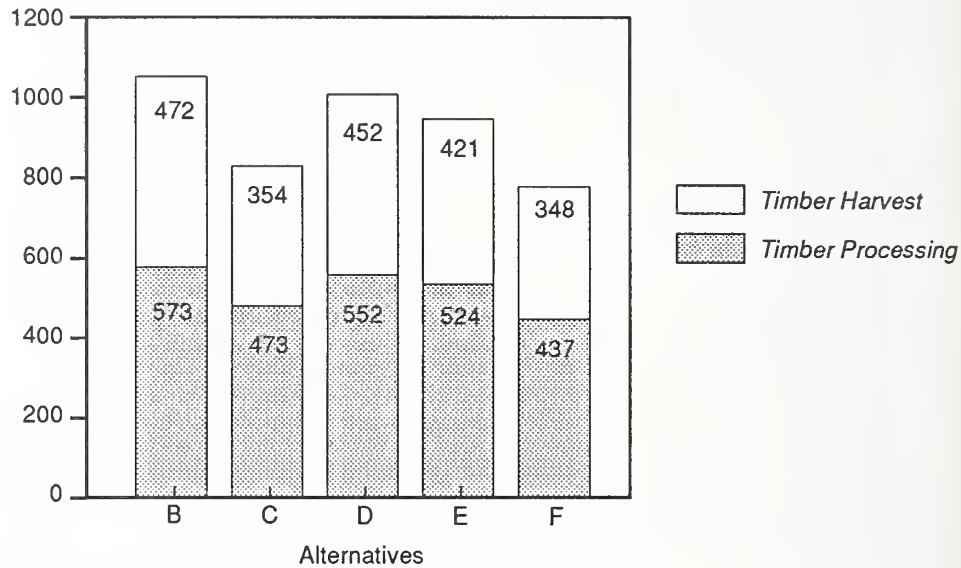
SOURCE: Morse 1992.
1 Number of jobs.

As would be expected, employment opportunity closely parallels the level of timber harvest. Alternatives B through F provide sufficient timber volume to maintain APC's current level of operations. The total volume harvested ranges from 137 MMBF in Alternative B to 104 MMBF in Alternative F. These volumes would be provided to APC in offerings that would maintain contract volume obligations. As a result, the annual harvest and annual mill production for each of these alternatives would be expected to remain relatively constant and would not have a significant effect on the timber industry or its dependent employment and income. Jobs in construction, logging, and marine transportation are closely related to the proposed action and represent approximately half the total direct employment supported under each of the alternatives (Figure 4-3). The total number of jobs in these three industries ranges from a high of 472 to a low of 348.

Under the No-Action Alternative, none of the employment described above would be supported by timber harvest activity in the Southeast Chichagof Project Area. If a sufficient volume of timber was not available from other sources within an acceptable time frame, selection of the No-Action Alternative could be expected to cause a significant impact to the economic base of communities dependent on timber harvest and processing by APC.

The Timber Sale Program Information Reporting System (TSPIRS) is an effort by the Forest Service to improve the way information is developed and displayed to help the public understand timber management. TSPIRS presents three reports of the national forest timber program for the year. The three reports are 1) the financial report; 2) the economic report; and 3) the employment, income, and program report. TSPIRS is produced and made available to the public on an annual basis.

Figure 4-3
Direct Employment (by Alternative)



SOURCE: Morse 1992.

Table 4-76 presents a summary of employment, income, and regional fiscal effects in the format of the agency-wide annual TSPIRS Report 3. Although it is not possible to accurately determine timber sale revenues to the Federal government, pond log values net of logging costs can be used as an approximation. As mentioned in Chapter 3, 25 percent of this amount will be returned to the State of Alaska and earmarked for schools and roads.

Table 4-76
Timber Sale Program Information Reporting System (TSPIRS) Report 3 - Components

	Alternative				
	B	C	D	E	F
Employment					
Direct Jobs	1,045	818	1,004	945	784
Indirect Jobs	451	350	431	411	338
Total Jobs	1,496	1,168	1,435	1,356	1,122
Local Fiscal Effects ($MM)					
Total Personal Income	52.66	41.31	50.54	47.66	39.55
Federal Income Tax Generated	10.01	7.85	9.60	9.06	7.51
25% Fund Payments to State (estimated)	2.10	2.41	3.05	2.65	2.34

SOURCE: Morse 1992.

Alternative D provides the highest timber receipts with an estimated $219 million accruing to the State, while the higher harvest costs under Alternative B drop the State's share of revenue to $137 million. Alternative A1/A2 does not generate any income for the State. When monetary receipts are reduced, communities must generate revenue through other sources to maintain the same quality and quantity of school programs and transportation systems. This may lead to a reorganization of the tax structure or the reduction or elimination of other programs.

Commercial Fishing Industry

As mentioned in the *Water and Fish* section in this chapter, potential impacts on fishery resources are minimal because of the site-specific standards and guidelines being applied along fish streams and because of the relatively small amount of fish habitat adjacent to harvest units. As a result, none of the alternatives is expected to have any effect on income or employment opportunities in the sport or commercial fishing industries or on any related economic sectors.

Recreation and Tourism Industry

Future employment in the recreation and tourism industries, including employment related to sport hunting and fishing, is projected to change at the same rate as future use. The projected use is expected to increase 27 percent for recreation and tourism, 36 percent for sport fishing, and 53 percent for hunting-related jobs during the 1990s (Forest Service 1990a). Consequently, total recreation and tourism related jobs in Southeast Alaska are estimated to increase in a similar manner. This change is not because of or affected by the proposed actions in the Southeast Chichagof Project Area.

Jobs and earnings related to expenditures made by deer hunters and salmon anglers are widely dispersed across Southeast Alaska. Hunters and anglers use the affected area to replenish their groceries and gasoline and take some meals in nearby communities, but most of their expenditures for equipment and initial supplies are made in their home community. Similarly, the employment and personal income generated by other people who use the Southeast Chichagof Project Area for recreation are dispersed across Southeast Alaska and throughout a variety of economic sectors. These people include individual recreationists, outfitter-guides and their clients, and tourists viewing the Project Area from cruise boats or from the Alaska Marine Highway ferry system.

The alternatives are not expected to have a significant effect on the tourism industry.

Because relatively little recreational activity takes place in the Southeast Chichagof Project Area, and because the alternatives would affect only some of the inventoried Recreation Places, no significant impact is expected on employment and income opportunities in the recreation and tourism industry. The expected effect of the alternatives would be to displace the recreational use to areas outside the Project Area. This displacement would be a result of recreationists seeking specific primitive or semiprimitive recreational opportunities that might no longer be available in the area of active timber harvest or road construction. This displacement would not result in any significant change in employment or income.

Commercial recreational activity in the Southeast Chichagof Project Area includes guided brown bear and deer hunting, and both freshwater and saltwater fishing. Brown bear habitat carrying capacity is not expected to be reduced significantly; however, deer habitat carrying capacity would be lowered by proposed harvest in the Southeast Chichagof Project Area (effects on habitat carrying capacity are fully discussed in the *Wildlife* section of this chapter). Outfitters predominantly guide bear hunters, and to a much lesser extent, deer hunters; thus, only limited effects to this form of commercial use would result. The activity associated with timber and road construction, and the lasting effects of the developments, has the potential to displace outfitters. When an outfitter goes out of business, a negative impact results. Displacement of outfitters, however, does not denote negative impacts to the analysis area. Although the alternative may result in some outfitters being displaced, none are expected to go out of business as a result of activities proposed through the year 2000. Therefore, significant impacts to recreational employment are not expected as a result of the action alternatives.

Lifestyles and Community Stability

In addition to changes in employment and income, implementation of each of the alternatives will have effects on other elements of community and individual lifestyles. These elements of lifestyle reflect the value of the recreation, visual, wildlife, fish, and subsistence resources of the Project Area. The effects of the proposed actions on these resources are described elsewhere in this chapter.

Community stability is a very important consideration in planning for timber harvest activities on the Tongass National Forest. In addition to the values described in the preceding discussions (employment, income, payments, population, and lifestyle), a balance between natural and human resource activities is important to the communities of Southeast Alaska. Many of the residents of Southeast Alaska derive their livelihood from the timber industry or benefit from the economic development the timber industry has brought to their communities. Many residents also participate in a wide variety of activities dependent on the National Forest and/or reside in Southeast Alaska because of the natural setting. As a result, a balance between economic development and an emphasis on non-commodity resources is a desirable objective.

Alternatives A1 and A2 may result in the inability of the Forest Service to meet its contractual obligations to the APC. Furthermore, it may result in a substantial cutback in APC production. This will have a significant negative effect on community stability. Alternatives B, D, and E disperse management activities and tend to bring those areas that have not yet been intensively developed under active timber management within the Project Area. This may have a negative effect on use of the area by people who require a more natural setting for recreation, subsistence, and other activities. Alternatives C and F, on the other hand, concentrate activities in areas already under intensive forest management and avoid harvest of areas with little previous entry. Essentially, all of the action alternatives strike a balance between intensive timber management and non-commodity uses. Therefore, there is little difference between the action alternatives' impact to community stability.

Cumulative Effects

The cumulative effects of each of the alternatives on the economic and social environment are quite difficult to estimate. There are a wide variety of factors affecting the employment, income, receipts, population, lifestyle, and community stability of Southeast Alaska. It is not easy to project the incremental effect of the proposed actions in the Southeast Chichagof Project Area on the past, present, and reasonably foreseeable future actions in the APC contract area. There are two aspects of a long-term timber harvest in the APC contract area, specifically in the Southeast Chichagof Project Area, that need to be addressed.

The first aspect relates to the economic and social benefit of continuing to meet the contractual requirements of the APC Long-term Timber Sale Contract and offering adequate timber volume to meet the timber demands in order to maintain APC operations at a stable level. From the standpoint of employment, personal income, population, community services, and community stability, there is substantial benefit from maintaining long-term timber harvest in the contract area. The receipts generated, including revenue to the U.S. Treasury, payments to the State of Alaska, State and local taxes, and dollars brought into the community, all represent an economic benefit of continued timber activity. The Southeast Chichagof Project Area is one component. The decision was made in the TLMP to allocate most of this area for long-term timber harvest. As such, the Southeast Chichagof Project plays a role in providing these economic and social benefits.

The second aspect of a long-term timber harvest that needs to be addressed is the alteration of the natural environment that takes place when roads are constructed and timber is harvested. As stated earlier, much of the economic and social value of Southeast Alaska is dependent on its natural setting. The recreation and tourism industry is based primarily on the natural conditions and visual resources. As more and more acres of National Forest and other land are converted from a natural condition to a managed forest, the activities dependent on and the values attributed to the natural state of the forested land will be adversely affected. One example is the recreational use that occurs in a primitive or semiprimitive setting. This type of use may be displaced by the timber activities in the Southeast Chichagof Project Area and will be confined to those areas where timber management is not part of the management prescription.

The balance necessary to maintain a viable or even robust economic and social environment must be set at a National Forest level, not at a project level. The cumulative effects on the economics and community values of the proposed actions for the Southeast Chichagof Project, or for that matter, any local project, will be relatively small compared to the effects of other factors. It is important to recognize both the effects of the proposed actions and the incremental nature of the effects.

Subsistence

ANILCA Section 810 Subsistence Evaluation

Section 810 of ANILCA requires a Federal agency having jurisdiction over lands in Alaska to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effects of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such federal agency:
>
> 1. gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;
>
> 2. gives notice of, and holds, a hearing in the vicinity of the area involved; and
>
> 3. determines that (A) such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

Chapter 3 addressed current and historical subsistence uses on the Southeast Chichagof Project Area by the rural communities of Angoon, Haines, Hoonah, Kake, Meyers Chuck, Petersburg, Sitka, Skagway, Tenakee Springs, and Wrangell and by the nonrural communities of Juneau and Ketchikan. This section evaluates how the proposed action alternatives could affect subsistence resources used by the above communities in the Southeast Chichagof Project Area. The subsistence resource categories evaluated are deer, other wildlife, fish, other foods (such as berries and kelp), and timber.

Criteria used to evaluate the effects of the proposed alternatives are (1) changes in abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from nonsubsistence users for those resources. The evaluation determines whether subsistence uses in the Project Area or portions of the Project Area may be significantly restricted by any of the proposed action alternatives. To determine this, the evaluation (1) considers the availability of subsistence resources in the surrounding areas, (2) considers the cumulative impacts of past and foreseeable future activities on subsistence users and resources, (3) looks at potential cultural and socioeconomic implications affecting subsistence users, and (4) focuses on the mapped subsistence use area in the Project Area.

The evaluation relies heavily upon the use of wildlife habitat capability models as well as upon ADF&G hunter survey data (see Appendix G for the habitat capability models used).

Evaluating the impact of alternatives on subsistence use of resources such as these sockeye salmon is a critical requirement for any timber harvest program.

The discussion of abundance, distribution, access, competition, and cumulative effects for deer appears as a separate section. The remaining resources are treated under the headings of *Abundance and Distribution of Other Subsistence Resources, Access, Competition, and Cumulative Effects Summary.*

This subsistence evaluation considers, with distinct findings by alternative and by resource category, whether or not there is a significant possibility of a significant restriction of subsistence use. The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the findings. By this definition:

> A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by non-rural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make his/her decision after a reasonable analysis of the information available.

The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional definitions of "significant restriction of subsistence uses" and are also used as guidelines in the findings. The definitions from *Kunaknana v. Watt* include:

Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting site; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents). Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in . . . non-rural resident hunting. The Final EIS evaluates the availability of subsistence resources in surrounding areas that could be accessed without undue risk or economic hardship to subsistence users.

Direct, Indirect, and Cumulative Effects

Subsistence Use Areas

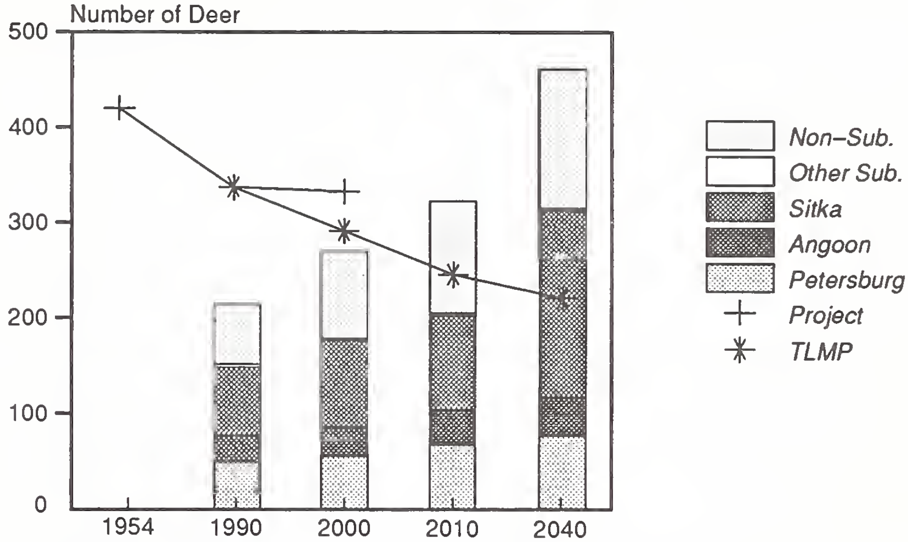
Specific areas within the Southeast Chichagof Project Area are more important than others for harvesting subsistence resources. Figure 3-9 depicts Southeast Chichagof Regional Subsistence Deer Harvest. Figure 3-10 depicts Southeast Chichagof Regional Marine Mammal Harvest. Figure 3-11 depicts Southeast Chichagof Marine Invertebrate Harvest. Figure 3-12 depicts Southeast Chichagof Regional Subsistence Salmon Harvest. The subsistence use areas depicted on these maps were developed from the TRUCS data base by J. Kruse. Only rural communities were surveyed by TRUCS, therefore use of the Project Area by Juneau and Ketchikan residents is not depicted. The marine invertebrate, marine mammal, and salmon harvest maps have areas highlighted where one or more households have ever harvested the resource. The deer harvest map depicts two intensities of use. Areas that are shaded dark are areas where more than 25 households have ever harvested deer. The lighter shading depicts areas where one to twenty-five households have ever harvested deer. The heaviest deer harvest use is concentrated along the beach fringe and in areas where logging roads provide access to inland areas (Corner Bay, Kook Lake, and Sitkoh Bay road systems).

Abundance and Distribution of Deer

Deer are an important subsistence resource used by the rural communities in the vicinity of the Southeast Chichagof Project Area. Chapter 4, *Wildlife* section, estimates that deer in WAAs 3309, 3629 and 3630 (Table 4-69) are currently being harvested at levels greater than the current population can sustain. Figures 4-4 through 4-9 display estimated deer available for harvest and estimated harvest demand by WAA. These figures compare current demand for deer with the estimated number of deer that were available for harvest in 1954, before any timber harvests. The average subsistence deer harvest levels in WAA 3309 is greater than the estimated population that could have been sustained prior to any timber harvest. The combined subsistence and nonsubsistence harvest in WAA 3629 is greater than the 1954 harvest capability. WAA 3630 has a model carrying capacity that is essentially equal to the population needed to support harvest. The estimated number of deer available for harvest is sufficient to meet current subsistence and nonsubsistence demands in WAAs 3308, 3627, and 3628.

Determining what harvest levels are sustainable assumes that habitat capability projections from the deer harvest model reflect an approximation of deer population. Furthermore, it is based on the determination by ADF&G that the sustainable harvest is 10 percent of the deer population (Flynn and Suring 1989).

Figure 4-4
WAA 3308 Estimated Deer Available For Harvest and Harvest Demand

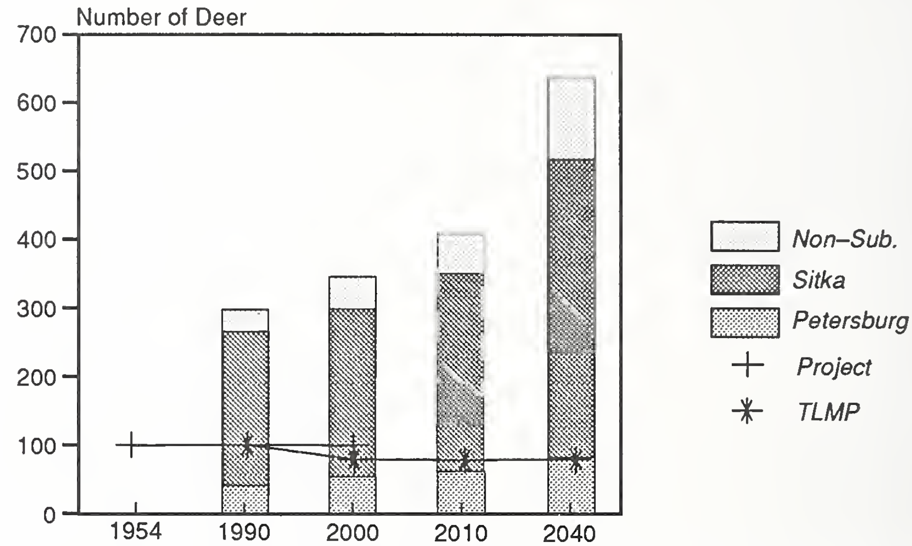


SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.

Note: Bars represent estimated and projected deer harvest demands assuming that harvest patterns remain constant and demand increases with projected population growth. "Project" line displays 10 percent of the estimated habitat capability for deer; (1) in 1954 before any timber harvests; (2) in 1990; (3) in 2000 using the carrying capacity of the alternative with the lowest carrying capacity in WAA. "TLMP" line displays 10 percent of the estimated carrying if the preferred alternative is implemented.

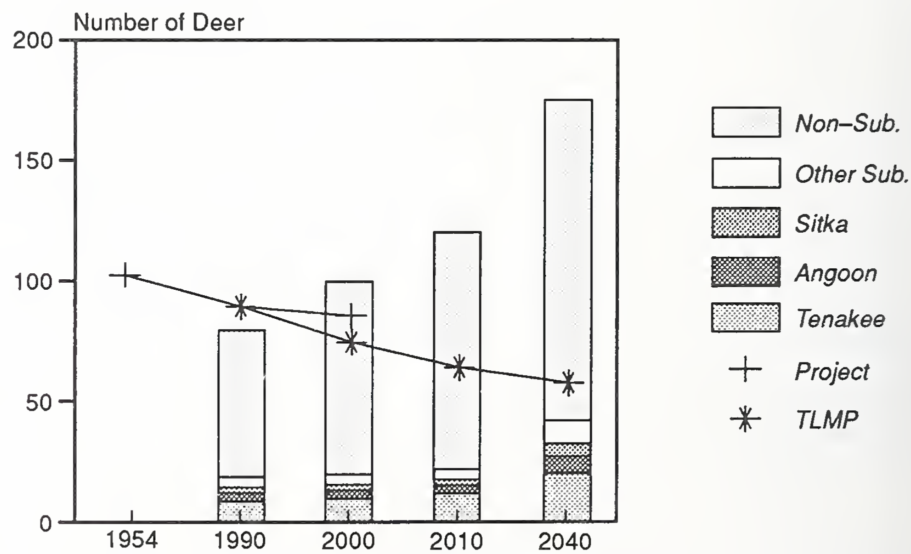
Table 4-77 shows the mean deer harvest for 1987 through 1990 for Project Area WAAs by rural and nonrural communities and shows percent of the deer harvested by rural and nonrural communities. It is assumed that the 1987 to 1990 mean deer harvest reflects rural and nonrural community use of deer in Project Area WAAs. ADF&G has only collected deer harvest data for individual WAAs since 1987. Averaging the deer harvest makes allowance for factors which influence deer numbers and hunting activity from year to year. These factors include weather patterns, access, habitat capability, and hunting success. Nonrural residents harvest over 50 percent of the deer from WAAs 3627, 3628, and 3629. WAA 3628 is the Kadashan drainage which is a LUD II and not available for timber harvest. Nonrural residents take at least 30 percent of the deer harvested from WAAs 3308 and 3630. Overall nonrural residents harvest 40 percent of the deer from the Project Area.

Figure 4-5
WAA 3309 Estimated Deer Available For Harvest and Harvest Demand



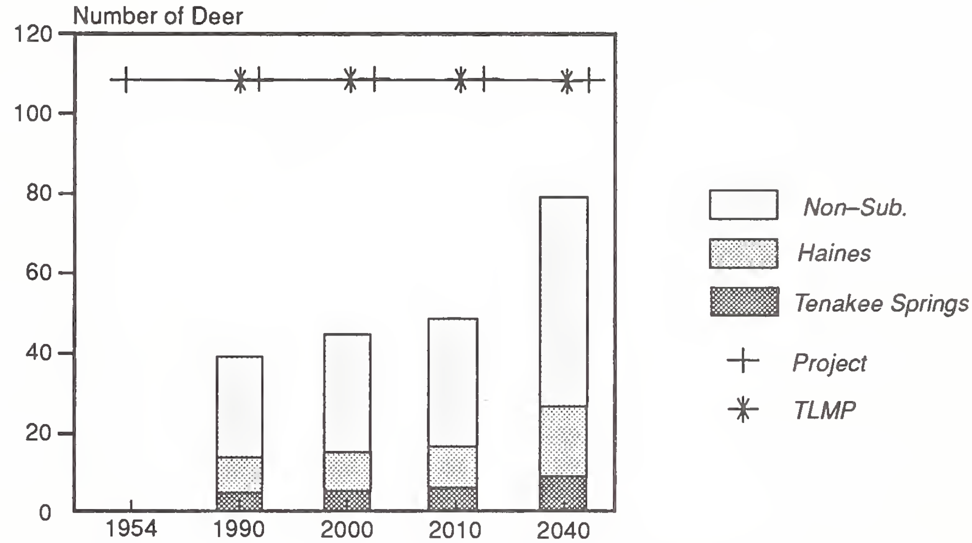
SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: Refer to "Note" in Figure 4-4.

Figure 4-6
WAA 3627 Estimated Deer Available For Harvest and Harvest Demand



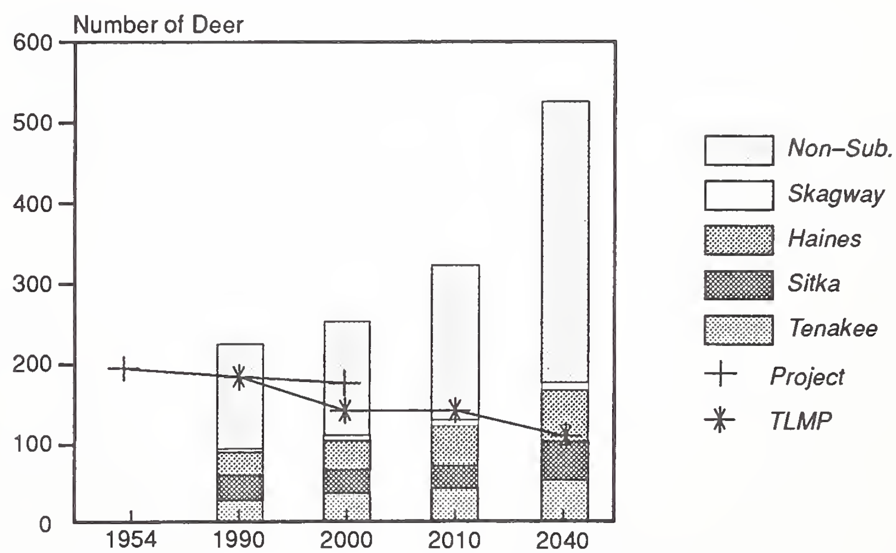
SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: Refer to "Note" in Figure 4-4.

Figure 4-7
WAA 3628 Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: Refer to "Note" in Figure 4-4.

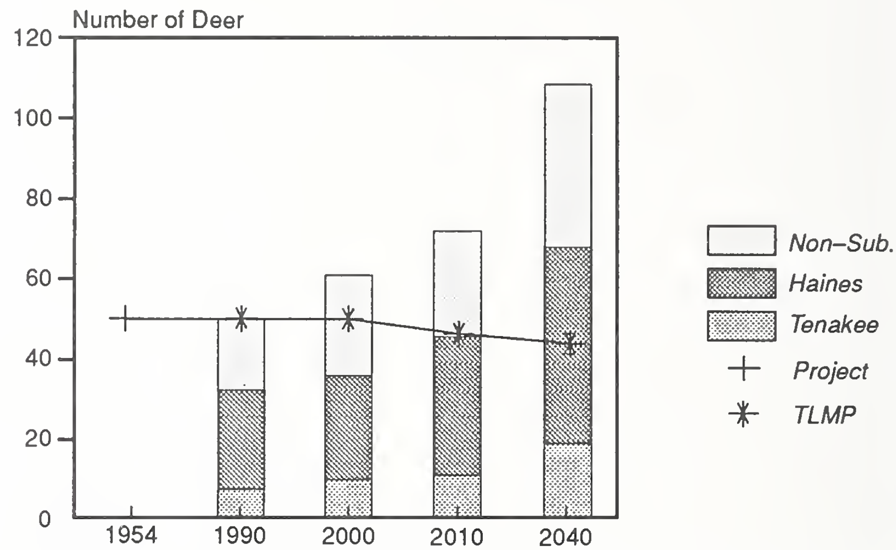
Figure 4-8
WAA 3629 Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: Refer to "Note" in Figure 4-4.

Figure 4-9

WAA 3630 Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.

Note: Refer to "Note" in Figure 4-4.

Table 4-77

Mean Deer Harvest for 1987 through 1990 (Project Area WAAs by Rural and Nonrural Communities)

	Deer Harvested			Percent Harvested	
WAA	Rural	Nonrural	Total	Rural	Nonrural
3308	158	66	224	70	30
3309	199	31	230	86	14
3627	22	62	84	26	74
3628	15	24	39	38	62
3629	89	149	238	37	63
3630	33	20	53	62	38
Total	516	352	868	59	41

SOURCE: Hartmann 1992b.

Note: This information derived from ADF&G Deer Hunter Survey Summary Statistics 1987-1990.

Deer abundance in WAAs 3308, 3627, and 3628 appears to be sufficient to sustain current levels of use by both rural and nonrural communities under all alternatives. Overall for all Project Area WAAs, the current habitat capability (10 percent harvest level) is less than the total average deer harvest for years 1987 to 1990 from both rural and nonrural communities (Table 4-78).

Table 4-78
Deer Populations Needed to Support Current Average Harvest to Meet Demand from Rural and Nonrural Communities

WAA	Rural	Nonrural	Total	Current Habitat Capability*
3308	1,580	660	2,240	3,160
3309	1,990	310	2,300	960
3627	220	620	840	899
3628	150	240	390	1,093
3629	890	1,490	2,380	1,798
3630	330	200	530	527
Total	5,160	3,520	8,680	8,437

SOURCE: Anderson 1992.
* Table 4-56 (From Chapter 4 *Wildlife*).
Note: This information derived from ADF&G Hunter Survey Summary Statistics 1987-1990.

Deer are one of the most important subsistence resources used by local communities.

The potential site-specific effects on deer habitat capability (reflects potential deer abundance) are evaluated in the *Wildlife* section. Past activities have reduced deer habitat capability in the Project Area in WAAs 3308, 3627, and 3629. The habitat capability model information projection of less than a 2 percent reduction in deer numbers may be expected from the proposed timber harvest alternatives. In some alternatives, the potential reduction approaches close to 1 percent. This potential reduction represents a range of 110 to 140 animals in a potential population of 7,412 (Table 4-57). The cumulative reductions in habitat capability from past and currently proposed actions range from 15 percent in the No-Action Alternative to 17 percent in Alternatives B, D, and E.

Figures 4-4 through 4-9 show the projected effects by WAA. A single graph is shown for each WAA based on the alternative, which would result in the greatest reduction of deer habitat in the WAA. Thus, different alternatives were chosen for different WAAs. The projected number of deer available for harvest in the year 2000 will be sufficient to meet both projected subsistence and nonsubsistence demands in WAAs 3308, 3627, and 3628. The projected number of deer available for harvest will be sufficient to meet only projected subsistence demands in WAAs 3629 and 3630. The projected number of deer available for harvest will be insufficient to meet all subsistence demands in WAA 3309 in the year 2000, just as it was insufficient to meet current subsistence demands before timber harvesting began.

Foreseeable changes in local deer herd distribution are expected in the Project Area when the age of the second growth on the past and proposed timber harvest units reaches 25 years. This conclusion is based on deer habitat utilization studies in Southeast Alaska.

Community and Subsistence Use of Deer

A measure of the relative impact by alternative to subsistence uses can be ranked by totalling the acres proposed for harvest that are used for subsistence by more than 5 percent of community households (Table 4-79). The resulting ranking, from lowest impact to highest impact, by alternative, is A, F, E, B, D, and C. In Alternative C, there is no harvest in VCUs 246 and 240, which consequently shifts the location of harvest units into the areas used by Tenakee Springs households. Alternative C is also the only alternative which does not propose a tie road between VCUs 246 and 233. A tie road between VCU 246 and 233 could potentially provide access to hunters coming from both Sitka and the Peril Strait area into the Crab Bay area and from Tenakee into the Peril Strait area. Tenakee Springs residents expressed concern about the potential increased competition for hunting.

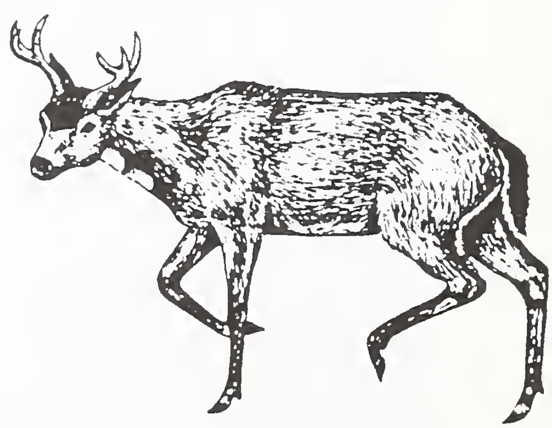


Table 4-79

Acreage Used by More than 5 percent of Rural Community Households that is Proposed for Timber Harvest or Roads (for All Project Area WAAs)

Rural Community	Alternative A1/A2	B	C	D	E	F
Angoon	0	0	49	49	3	0
Haines	0	20	20	11	7	0
Hoonah	0	0	0	0	0	0
Kake	0	0	0	0	0	0
Meyers Chuck*	0	0	383	407	383	425
Petersburg	0	0	17	17	0	0
Sitka	0	0	1	1	0	0
Skagway	0	0	0	0	0	0
Tenakee Springs	0	2,691	3,351	3,277	2,298	2,108
Wrangell	0	0	0	0	0	0
Total	0	2,711	3,821	3,762	2,691	2,533

SOURCE: Hartmann 1992b. This information derived from TRUCS database.

* Meyers Chuck residents did not harvest deer from the Project Area from 1987 to 1990

The next sections are organized by community. They draw on four types of data presentations: (1) maps depicting harvest areas and proposed actions, (2) tables with analyses of changes in land used for subsistence, (3) figures comparing the projected number deer available for harvest in Project Area WAAS under proposed actions with projected demand for deer, and (4) figures comparing cumulative changes in deer supply and demand for areas which currently contribute 90 percent of the deer harvested by a community.

The first type of data consists of maps depicting the geographic relationship between proposed cutting units and roads under each alternative and areas used now or in the past for deer hunting by the residents of a particular community. Maps corresponding to Alternatives A1 and A2 would not significantly differ from the existing situation (see Figures 3-15 through 3-24). Since there are 10 communities and 5 "action" alternatives, 50 maps are required to display this information. Therefore, in this chapter, maps will be shown for the first community discussed. Other maps are displayed in Appendix E. There are no maps for Juneau or Ketchikan.

The second type of data presentation displays the amount of acreage overlapping between proposed cutting units and roads and areas used for subsistence deer hunting by more than 5 percent of the households in a given community in acres and percent. Again, these tables are incorporated into the text for the first community discussed. Acreage and percentage figures for the remaining communities appear in Appendix E.

The third type of data presentation compares the estimated supply and demand for deer by WAA (see Figures 4-4 through 4-9). These figures were generally discussed in the previous section. They show (1) the estimated effects of the proposed project on each area's ability to support deer populations; (2) the estimated effects on deer carrying capacity if the preferred alternative of the TLMP is implemented; and (3) the projected demand for deer for subsistence

and nonsubsistence uses if the distribution of hunting activity remains constant but total demand increases with population growth. These figures help answer the question of whether the proposed project will reduce the number of deer available below projected subsistence demands. Tables E21 through E32 in Appendix E contain the compiled ADF&G annual deer harvest data used as the basis for estimating demand for deer by WAA and by community. Table E-20 in Appendix E summarizes by WAA deer supply and demand.

The fourth and final type of data presentation compares the estimated supply and demand for deer for the area from which a particular community currently harvests 90 percent of its total deer harvest. These figures show (1) the estimated effects on the area's ability to support deer populations if the TLMP is implemented, and (2) the estimated demand for deer for the same area, assuming demand increases with population growth. These figures help answer the question of whether the cumulative effects of past activities, proposed actions, and TLMP will reduce the number of deer available to a number below subsistence demands in each community's primary use area. See Appendix E, Table E-20 for a summary of the data in these figures.

Tenakee Springs

With the exception of Alternatives A1 and A2, each of the proposed alternatives include cutting units located in areas used by Tenakee residents for deer hunting (see Figures 4-10 through 4-14). Alternative C involves the greatest aggregate overlap between cutting units, roads, and Tenakee deer harvest areas (3,352 acres), and Alternative D involves the second greatest overlap (3,277 acres) (see Tables 4-79 through 4-81). Alternative C is the only alternative which does not propose a tie road across Chichagof Island between VCUs 246 and 233. Such a tie road could potentially provide access to hunters coming primarily from Sitka via Peril Strait into the Crab Bay area on Tenakee Inlet, thus increasing competition for deer in WAA 3629. Road management objectives for all alternatives propose management for this road to reduce or eliminate vehicle traffic.

The greatest overlap in acreage of subsistence deer harvest areas and proposed cutting units and roads ranges from 3 percent of WAA 3629 (the south side of Tenakee Inlet between Kadashan Bay and the head of the Inlet) in Alternatives E and F to 6 percent of the same WAA (3629) in Alternative B (Table 4-81). Greater variations by alternative occur by VCU, with VCU 233 and 234 (between Crab Bay and Kadashan Bay) ranging from 6 percent overlapping acreage to 15 percent overlapping acreage. Other VCUs showing variation of more than 5 percent by alternative include 232 (Crab Bay), 240 (Basket Lake), and 241 (Little Basket Lake).

Within the Project Area, WAA 3629 currently provides the largest number of deer for Tenakee residents. Figure 4-8 shows that the projected number of deer available for harvest under the project alternative associated with the greatest reduction in deer habitat in WAA 3629 is sufficient to meet the projected subsistence demand for deer through the year 2010. This figure also shows that the estimated number of deer available in WAA 3629 is now (and even prior to any timber harvests) insufficient to meet both nonsubsistence and subsistence demands, indicating that restrictions on nonsubsistence demands may become necessary even without the proposed project.

Figure 4- 10
Tenakee Springs Subsistence Analysis—Alternative B

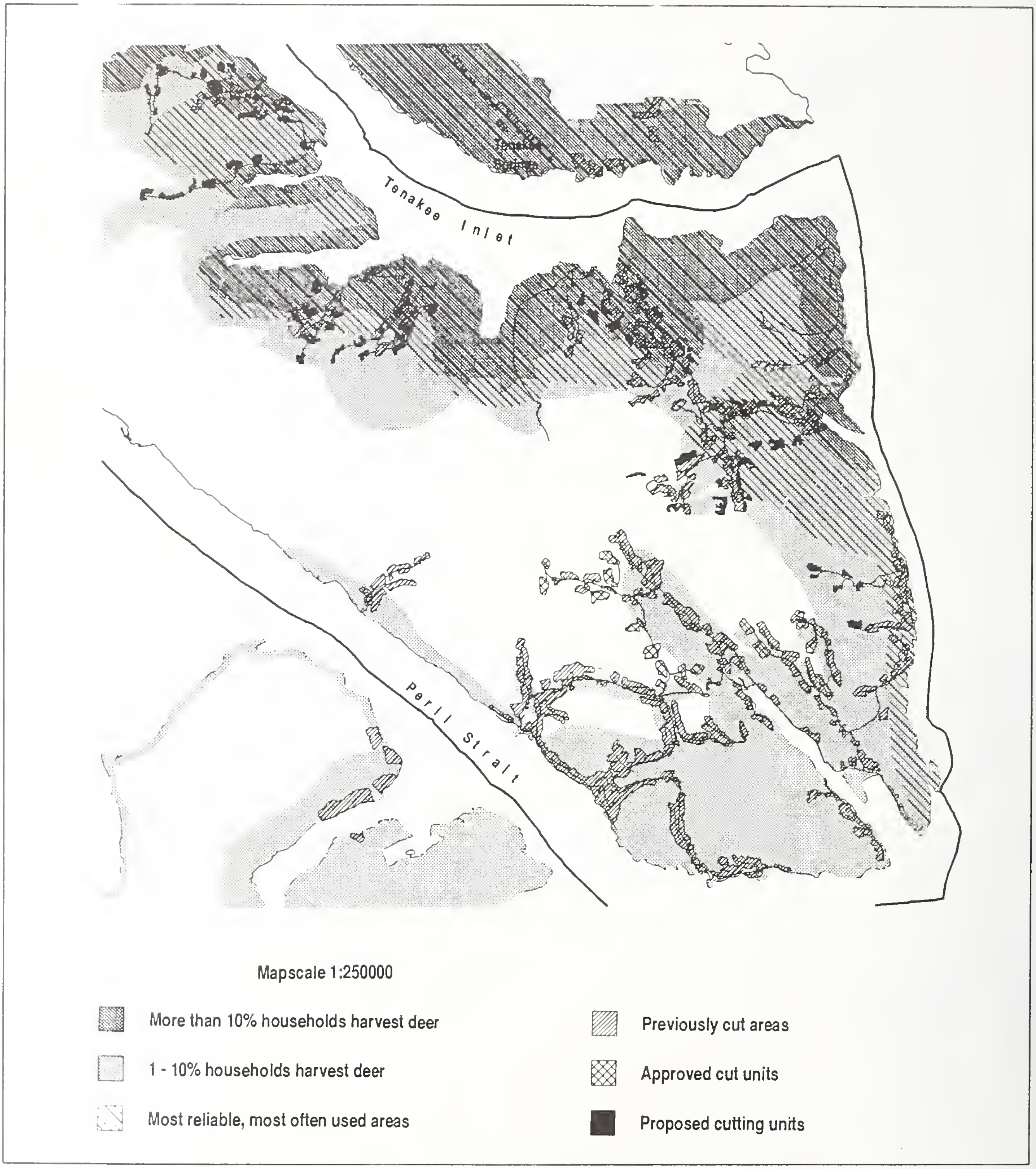
Mapscale 1:250000

- More than 10% households harvest deer
- 1 - 10% households harvest deer
- Most reliable, most often used areas
- Previously cut areas
- Approved cut units
- Proposed cutting units

SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Figure 4-11

Tenakee Springs Subsistence Analysis—Alternative C



SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

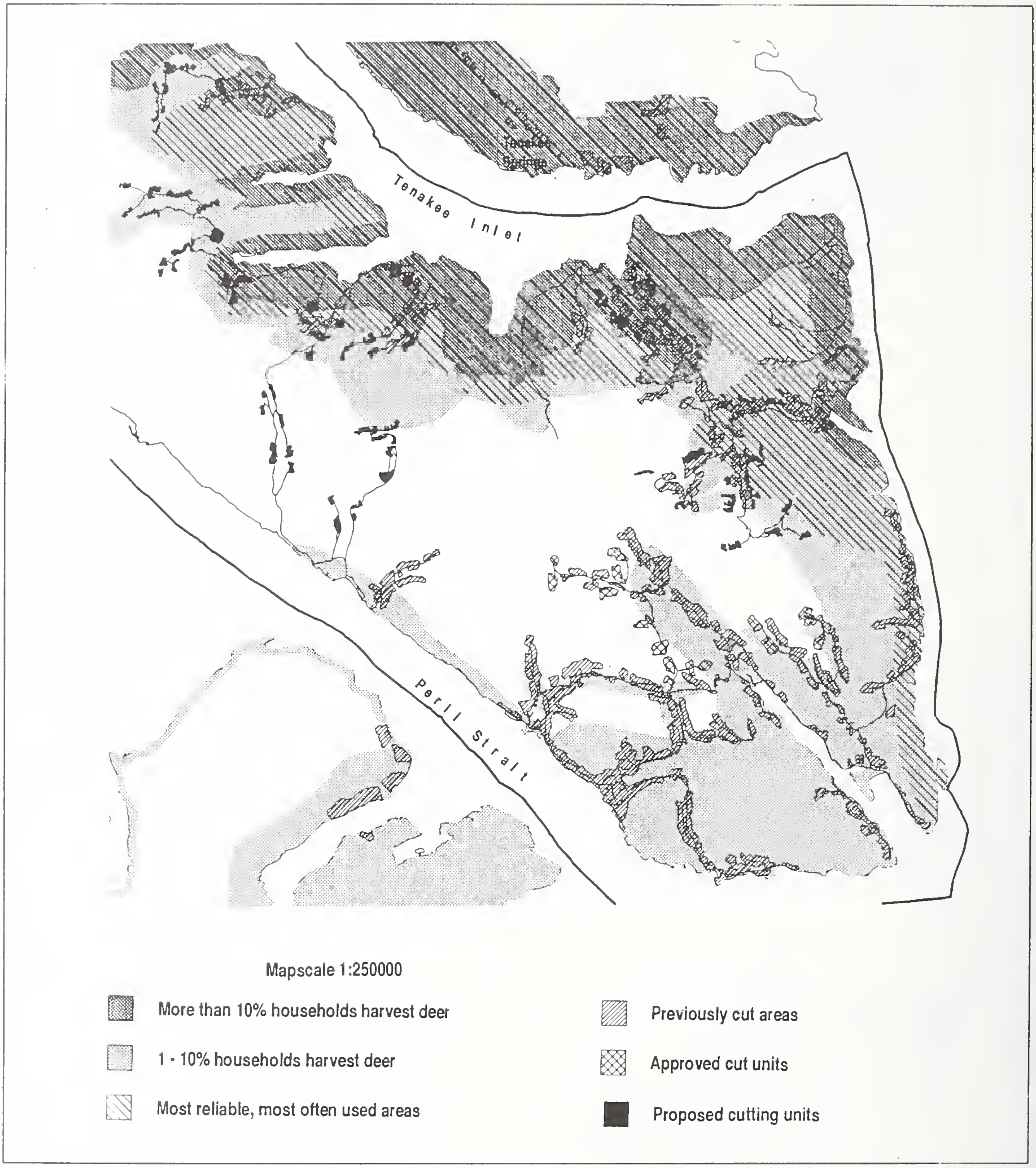
Figure 4-12
Tenakee Springs Subsistence Analysis—Alternative D

Mapscale 1:250000

More than 10% households harvest deer
1 - 10% households harvest deer
Most reliable, most often used areas
Previously cut areas
Approved cut units
Proposed cutting units

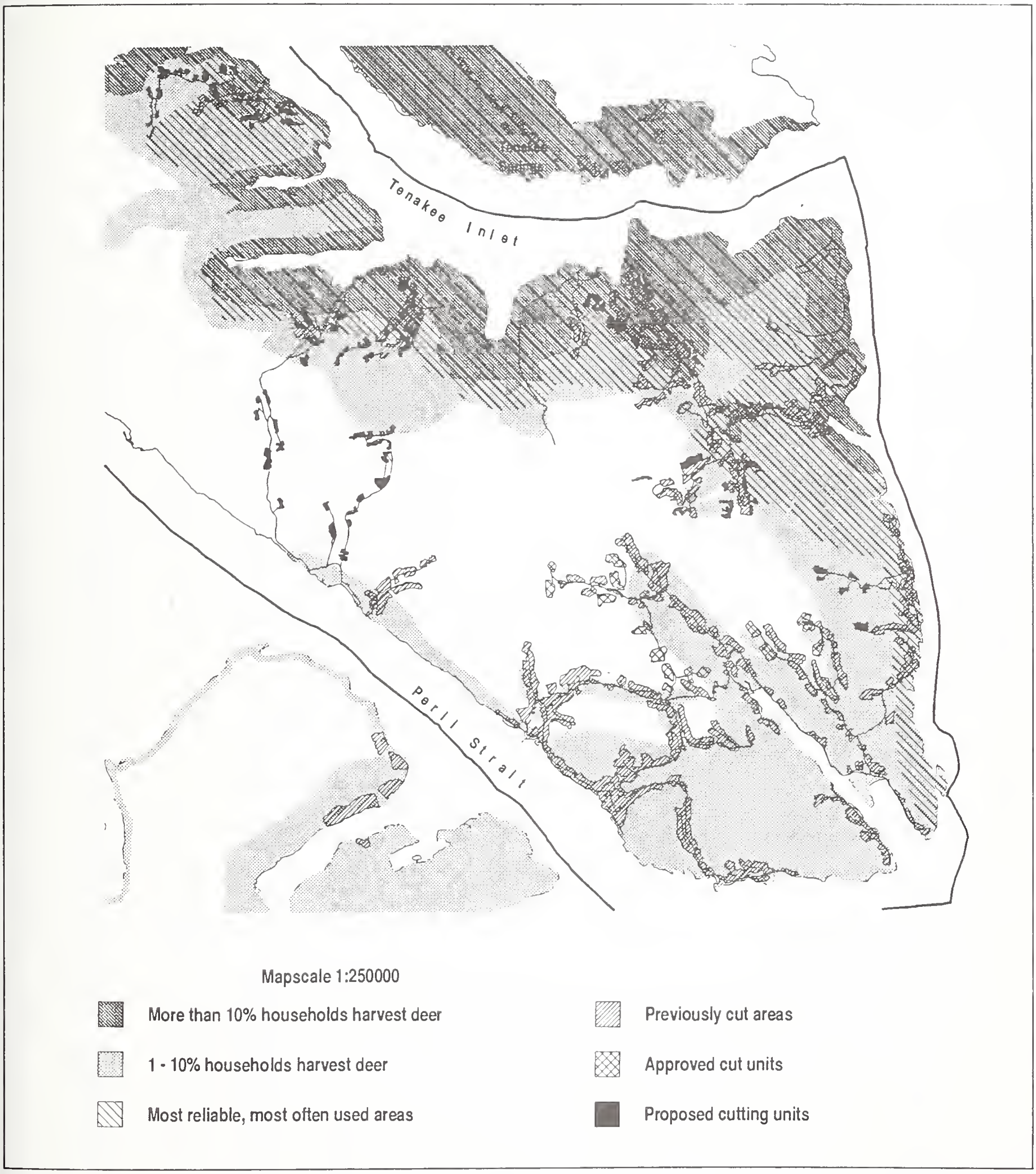
SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Figure 4-13
Tenakee Springs Subsistence Analysis—Alternative E



SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Figure 4-14
Tenakee Springs Subsistence Analysis—Alternative F



SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Table 4-80
Analysis of Changes in Land Used for Subsistence by Tenakee Springs (in acres)

Area	Total Acres	Acreage Used by More than 5% of Community Households	Acreage Used by More than 5% of Community Households							
			Acreage Cut Since 1965 or Roaded	Acreage Approve for Cut	Alternative					
					A1/A2	B	C	D	E	F
Chatham Area		229,653	15,501	479						
Project Area	304,547	114,442	10,890	277	0	2,692	3,351	3,277	2,298	2,108
WAA										
3629	97,823	42,884	1,491	0	0	2,692	1,951	1,924	1,351	1,277
3309	43,072	0	0	0	0	0	0	0	0	0
3308	109,460	34,250	7,323	67	0	0	868	897	415	277
3627	27,309	27,062	2,048	209	0	0	532	456	532	554
3628	33,706	8,608	27	0	0	0	0	0	0	0
3230	70,829	12,991	62	0	0	0	0	0	0	0
3310	50,852	0	0	0	0	0	0	0	0	0
3311	56,364	0	0	0	0	0	0	0	0	0
3312	20,446	167	0	0	0	0	0	0	0	0
3313	74,199	20,167	448	0	0	0	0	0	0	0
3315	22,171	2,180	230	0	0	0	0	0	0	0
3319	87,446	0	0	0	0	0	0	0	0	0
3523	56,491	2,964	109	63	0	0	0	0	0	0
3526	44,982	41,2137	2,360	0	0	0	0	0	0	0
4253	46,309	16	0	0	0	0	0	0	0	0
VCU										
227	3,805	1,553	0	0	0	0	0	0	0	0
228	18,626	6,952	0	0	0	0	0	0	0	0
229	22,512	5,111	310	0	0	0	0	0	0	0
230	9,344	8,123	313	0	0	700	648	479	306	584
231	18,886	8,114	15	0	0	338	327	370	46	0
232	11,222	6,029	0	0	0	519	3	198	256	0
233	10,099	4,117	310	0	0	621	464	496	464	316
234	5,791	4,505	543	0	0	513	509	381	278	377
235	34,262	8,684	27	0	0	0	0	0	0	0
236	11,025	10,413	1,907	0	0	0	533	457	533	554
237	6,423	6,610	0	0	0	0	0	0	0	0
238	9,829	9,990	163	209	0	0	0	0	0	0
239	17,284	10,540	1,635	67	0	0	535	175	392	277
240	9,364	4,645	0	0	0	0	0	374	23	0
241	7,640	2,338	702	0	0	0	288	288	0	0
242	22,424	5,348	748	1	0	0	18	32	0	0
243	27,177	4,306	926	0	0	0	27	27	0	0
244	23,283	2,790	1,424	0	0	0	0	0	0	0
245	23,8899	4,274	1,867	0	0	0	0	0	0	0
246	17,275	0	0	0	0	0	0	0	0	0
247	16,387	0	0	0	0	0	0	0	0	0

SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Table 4-81
Analysis of Changes in Land Used for Subsistence by Tenakee Springs (in percent)

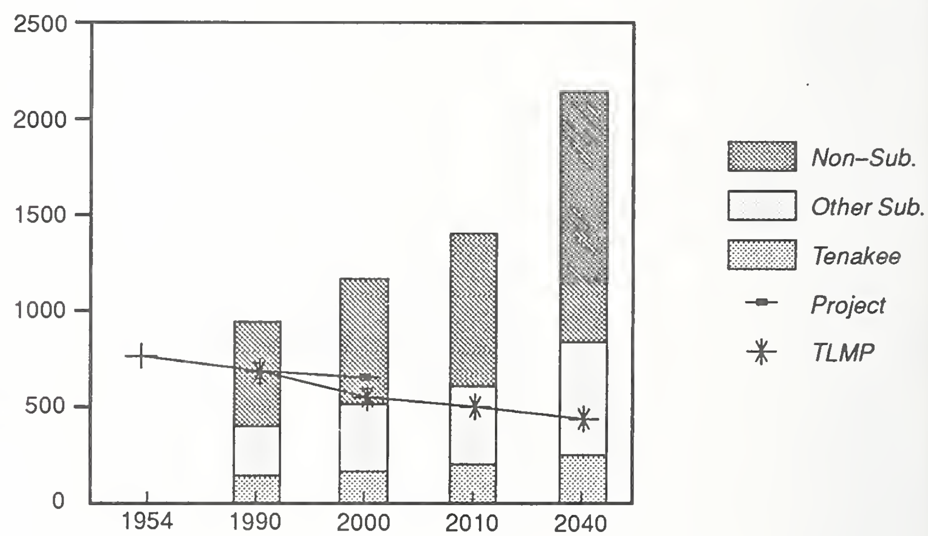
Area	Total Acres	Acreage Used by More than 5% of Community Households	Acreage Used by More than 5% of Community Households: Acreage Cut Since 1965 or Roaded	Acreage Approve for Cut	Alternative: A1/A2	B	C	D	E	F
Chatham Area			7	0						
Project Area		38	20	0						
WAA										
3629		44	3			6	5	4	3	3
3309		0								
3308		31	21	0			3	3	1	1
3627		99	8	1			2	2	2	2
3628		26	0							
3230		18	0							
3310		0								
3311		0								
3312		1								
3313		27	2							
3315		10	11							
3319		0								
3523		92	6							
4253		0								
VCU										
227		41								
228		37								
229		23								
230		87	4			9	8	6	4	7
231		43	0			4	4	5	1	
232		54				9	0	3	4	
233		41	8			15	11	12	11	8
234		78	12			11	11	8	6	8
235		25	0							
236		94	18			5	4	5	5	
237		103								
238		102								
239		61	16	1			5	2	4	3
240		50					5	2	4	3
241		31	30				12	12		
242		47	14	0			0	1		
243		16	22				1	1		
244		23	51							
245		18	44							
246		0								
247		0								

SOURCE: J. Kruse 1991. Information derived from TRUCS database, GIS.

Figure 4-8 also shows the estimated deer available for harvest in WAA 3629 if the preferred alternative of the TLMP is implemented. According to these projections, insufficient deer will be available to meet projected demand for subsistence uses by the year 2040, assuming subsistence users do not shift some of their hunting elsewhere.

Figure 4-15 shows the estimated demand for deer by Tenakee residents and other subsistence and nonsubsistence users for the area corresponding to the smallest number of WAAs that cumulatively supply 90 percent of Tenakee's current annual deer harvest. Also shown in Figure 4-15 is the projected number of deer available for harvest, assuming the greatest projected habitat reduction under the proposed alternatives. This comparison of deer supply and demand indicates that there are currently and will be sufficient deer available for subsistence use in Tenakee's primary hunting area through the year 2000 but insufficient deer available for both subsistence and nonsubsistence use by the year 2010.

Figure 4-15
Tenakee: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.

Note: Bars represent estimated and projected deer harvest demands assuming that residents continue to use the areas from which they presently harvest 90 percent of their deer and demand for deer increases with projected community population growth at 18% per decade through 2010 and 15% per decade from 2010 through 2040. "TLMP" line displays 10 percent of the estimated carrying capacity if the preferred alternative is implemented.

Figure 4-15 compares projected demands for deer through 2040 with projected habitat changes under the preferred alternative of the TLMP. These figures suggest that all subsistence users, including Tenakee residents, could meet their harvest demands in this area through 2000 if nonsubsistence use were substantially restricted. Habitat changes, coupled with increasing subsistence demand, could mean that all subsistence demands for deer could not be met by 2010 unless other areas with deer available for harvest were used more heavily.

Based on the projected overlap between Tenakee hunting areas and proposed units, the projected effect of one or more alternatives on the estimated number of deer available to harvest in WAA 3629, and the potential cumulative effect of TLMP on Tenakee deer harvesting areas as a

whole, there is a significant possibility of a significant restriction of subsistence use of deer for Tenakee residents. It may be possible to minimize or avoid this restriction by regulating nonsubsistence use of areas most heavily used by Tenakee residents for deer hunting. Tenakee residents may also shift some of their hunting to WAA 3627, which is designated as a LUD II area where no timber harvests are scheduled and deer harvest capability exceeds demand.

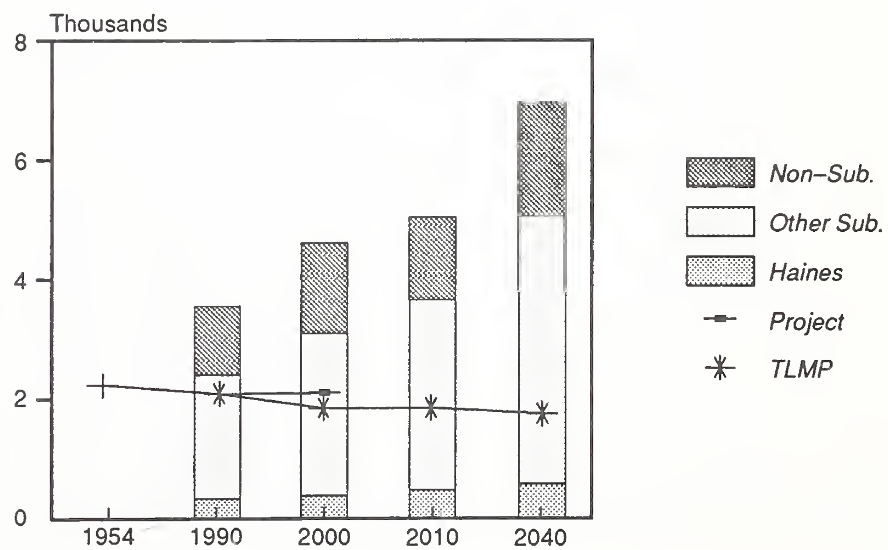
Haines

While Haines residents derive only 15 percent of their subsistence harvest from deer, they derive 28 percent of their deer harvest from the Project Area, primarily along Tenakee Inlet in WAA 3629. This WAA currently is estimated to have insufficient deer to meet both subsistence and nonsubsistence demands (see Figure 4-8) but is projected to have sufficient deer for subsistence demands under all project alternatives. Under TLMP, the estimated deer available for harvest in WAA 3629 would be sufficient for subsistence demands through 2010.

Figure 4-16 shows the estimated demand for deer by Haines residents and other subsistence and nonsubsistence users for the area corresponding to the smallest number of WAAs that cumulatively supply 90 percent of Haines' current annual deer harvest. This area currently is estimated to have insufficient deer to support both subsistence and nonsubsistence harvests. Also shown on Figure 4-16 is the projected number of deer available for harvest, assuming the greatest projected habitat reduction under the proposed alternatives. These proposed actions will not significantly affect Haines's ability to meet its deer harvest requirements. Implementation of the preferred alternative of TLMP is not projected to affect this situation significantly.

Based on the projected effect of one or more alternatives on the estimated number of deer available to harvest in WAA 3629 (see Figure 4-8), there is a significant possibility of a significant restriction of subsistence use of deer for Haines residents. It may be possible to minimize or avoid this restriction by regulating nonsubsistence uses of areas most heavily used by Haines residents for deer hunting (see Appendix E, Figures E-6 through E10).

Figure 4-16
Haines: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Sitka

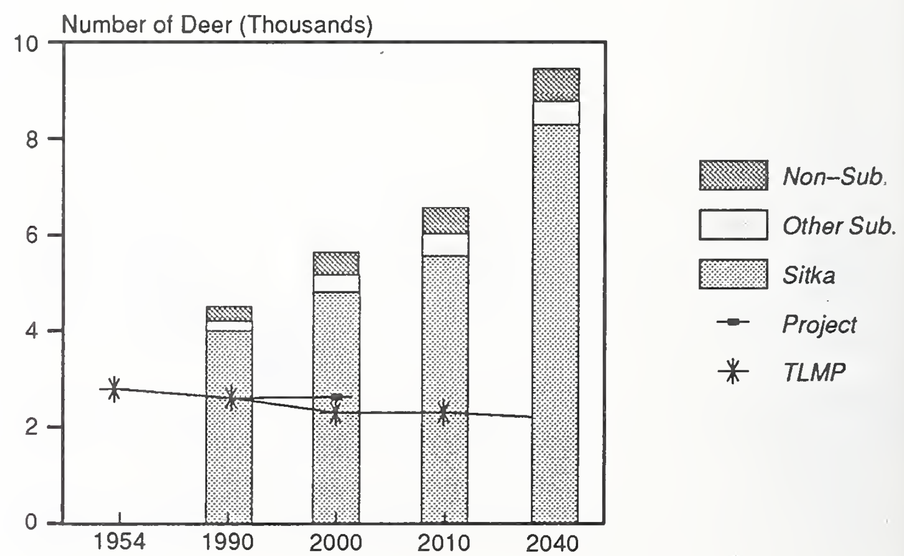
Ten percent or less of Sitka households harvest deer from the Project Area. Therefore, acreage of proposed timber harvest in areas used by more than 5 percent of community households is extremely low. The only area within the Project Area boundaries used by more than 5 percent of Sitka households is VCU 245, located on the north side of Peril Strait east of Broad Island to Sitkoh Bay. None of the proposed alternatives include cutting units or additional roads in this area. Alternatives B, D, E, and F include proposed cutting units on the north side of Peril Strait west of Broad Island. Each of these alternatives includes a tie road across Chichagof Island, potentially providing access for Sitka hunters to Tenakee Inlet. The tie road could be managed to limit motor vehicle access. Road Management Objectives for most alternatives propose management of this road to seasonally restrict vehicle traffic.

Sitka hunters' primary use of the Project Area for deer hunting takes place in WAA 3309. The hunters get 5 percent of its deer from this area. Current subsistence harvest levels in this WAA exceed the estimated number of deer available for harvest (see Figure 4-5). None of the project alternatives would significantly change this situation. Figure 4-5 also shows the projected effects of implementing the preferred alternative in TLMP. The cumulative effect of TLMP would take place by the year 2000.

Figure 4-17 shows the estimated demand for deer by Sitka residents and other subsistence and nonsubsistence users for the area corresponding to the smallest number of WAAs that cumulatively supply 90 percent of Sitka's current annual deer harvest. Also shown in Figure 4-17 is the projected number of deer available for harvest, assuming the greatest projected habitat reduction under the proposed alternatives. The proposed actions would not significantly affect Sitka's ability to meet its deer harvest requirements, which already exceed the estimated number of deer available for harvest. The estimated cumulative effect of implementing the preferred alternative of TLMP would be a marginal widening of the existing gap between deer supply and demand.

Figure 4-17

Sitka: Estimated Deer Available For Harvest and Harvest Demand



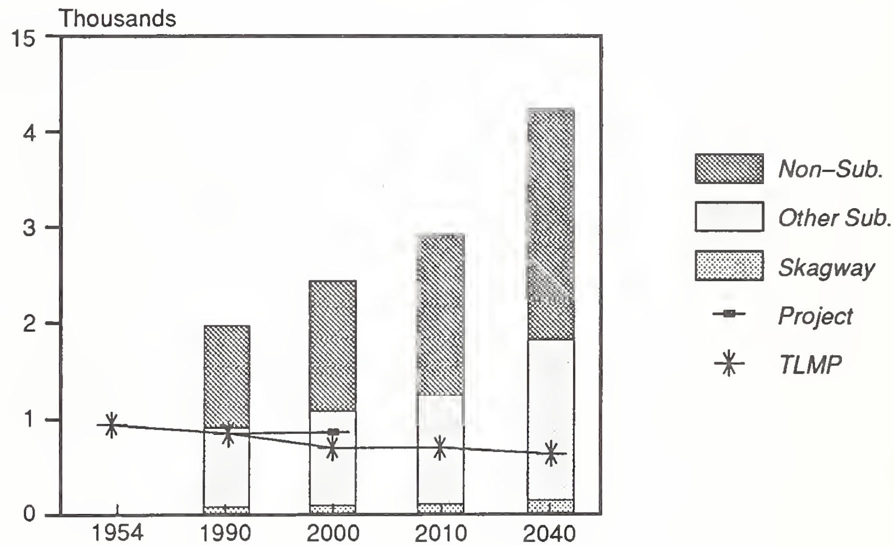
SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Based on the projected effect of one or more alternatives on the estimated number of deer available to harvest in WAA 3629 (see Figure 4-8), there is a significant possibility of a significant restriction of subsistence use of deer for Sitka residents. It may be possible to minimize or avoid this restriction by regulating nonsubsistence uses of areas most heavily used by Sitka residents for deer hunting.

Skagway

Deer constitutes 6 percent of the subsistence harvest of Skagway residents. In recent years, the proportion of all deer harvested by Skagway residents coming from the Project Area has ranged from zero to 39 percent and averaged 15 percent. Projected effects of project alternatives on deer harvest capability in the primary WAA used by Skagway residents (WAA 3629) may be significant (see Figure 4-8). The area used to harvest 90 percent of the deer used by Skagway residents is unable to support sufficient deer to meet all current subsistence demands. None of the proposed project alternatives would affect this situation (see Figure 4-18). The implementation of the preferred alternative of TLMP would marginally decrease deer habitat in the area. The major change projected, however, is an increase in subsistence and nonsubsistence demand.

Figure 4-18
Skagway: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Based on the projected effect of one or more alternatives on the estimated number of deer available to harvest in WAA 3629, there is a significant possibility of a significant restriction of subsistence use of deer for Skagway residents. It may be possible to minimize or avoid this restriction by regulating nonsubsistence uses of areas most heavily used by Skagway residents for deer hunting.

Angoon

Angoon residents primarily use the beach fringe on Chichagof Island from False Island around to Kook Lake. There is little overlap of proposed harvest units with the area where Angoon residents hunt. Areas important to Angoon where harvest is proposed are Kook Lake, Basket Lake, and Little Basket Lake. Proposed units are outside of areas where more than 10 percent of Angoon households harvest deer, but there is some overlap within areas where 1 to 10 percent of Angoon households harvest deer (see maps in Appendix E). Alternatives C and D include proposed cutting units and roads in VCU 241 (Little Basket Lake area) which would directly affect 5 percent of the area within the VCU used by Angoon residents for deer hunting. Alternative D would connect the roads from Sitkoh Bay to Corner Bay on the Tenakee Inlet. This could increase competition between Sitka, Angoon, and Tenakee residents, although there is an extensive road system already used by these residents.

Angoon's principal use of the Project Area for deer hunting occurs in WAA 3308. Angoon gets 9 percent of its deer from this WAA. Current subsistence and nonsubsistence harvest levels in this WAA are below the estimated number of deer available for harvest (see Figure 4-4). None of the project alternatives would significantly change this situation. Figure 4-4 also shows the projected effects of implementing the preferred alternative in TLMP. Under TLMP the estimated deer available for harvest in WAA 3308 would be sufficient for both subsistence and nonsubsistence demands through 2000, sufficient for subsistence demands through 2010, and insufficient for subsistence demands by 2040.

Figure 4-19 shows the estimated demand for deer by Angoon residents and other subsistence and nonsubsistence users for the area corresponding to the smallest number of WAAs that cumulatively supply 90 percent of Angoon's current annual deer harvest. Also shown in Figure 4-19 is the projected number of deer available for harvest assuming the greatest projected habitat reduction under the proposed alternatives. These proposed actions would not significantly affect Angoon's ability to meet its deer harvest requirements. Implementation of the preferred alternative of TLMP coupled with projected increases in demand may mean that there is an insufficient number of deer available for harvest in Angoon's primary use areas to meet both subsistence and nonsubsistence demands by 2010 and an insufficient supply of deer for subsistence demands by 2040.

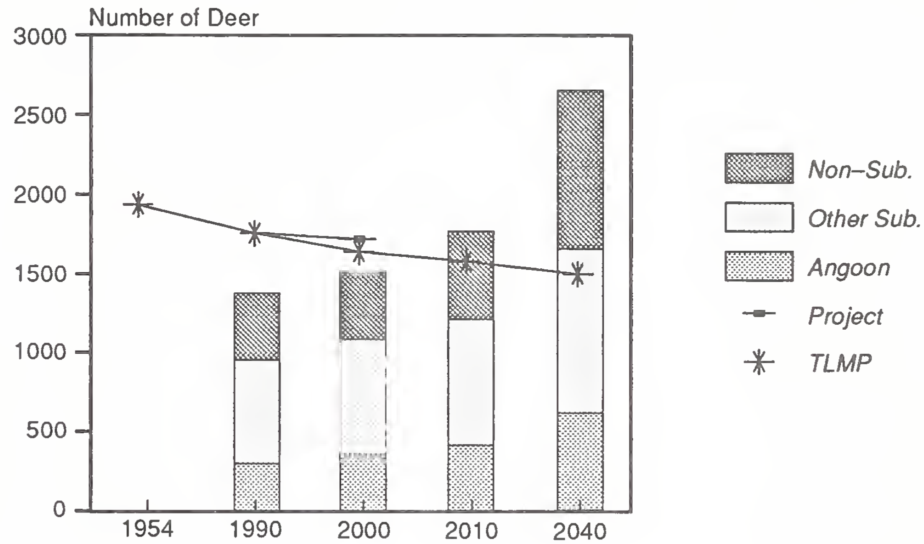
Based on the concern of Angoon residents about potential increases in competition because of road additions, there is a significant possibility of a significant restriction of subsistence use of deer for Angoon residents. It may be possible to minimize or avoid this restriction by regulating road use and nonsubsistence uses of areas most heavily used by Angoon residents for deer hunting.

Hoonah

Hoonah residents did not report deer harvesting from Project Area WAAs from 1987 through 1990. Proposed actions are therefore unlikely to have direct effects on Hoonah deer harvests. Figure 4-20 shows current and projected conditions for the area from which Hoonah residents derive 90 percent of their deer harvest. Habitat conditions in 1954 in this area could not support sufficient numbers of deer to meet current subsistence demands. The cumulative effect of implementing the preferred alternative in TLMP would be to marginally reduce deer habitat. This, coupled with increases in demand for deer, is projected to support insufficient numbers of deer to meet the harvest demands of Hoonah residents alone by the year 2000.

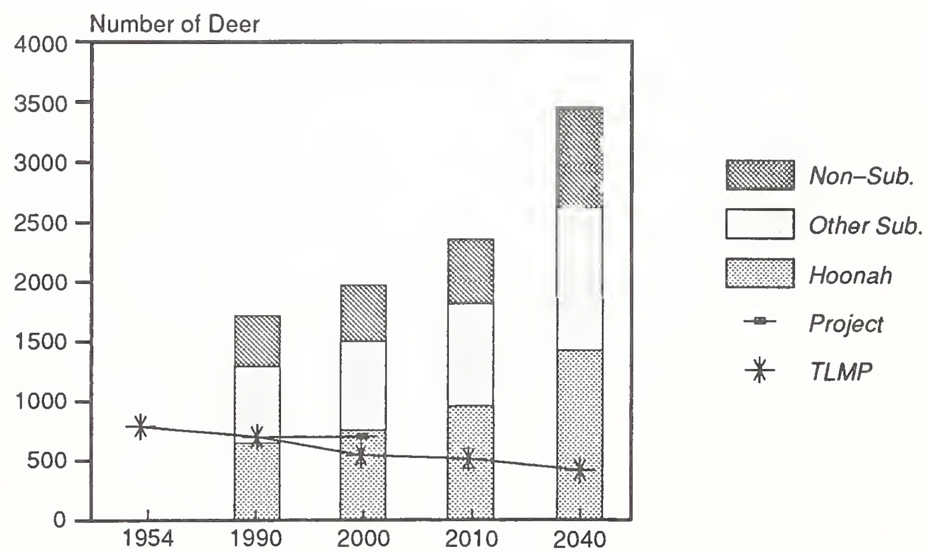
Based on the lack of projected direct effects on Hoonah deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Hoonah residents associated with the proposed ac-

Figure 4-19
Angoon: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Figure 4-20
Hoonah: Estimated Deer Available For Harvest and Harvest Demand



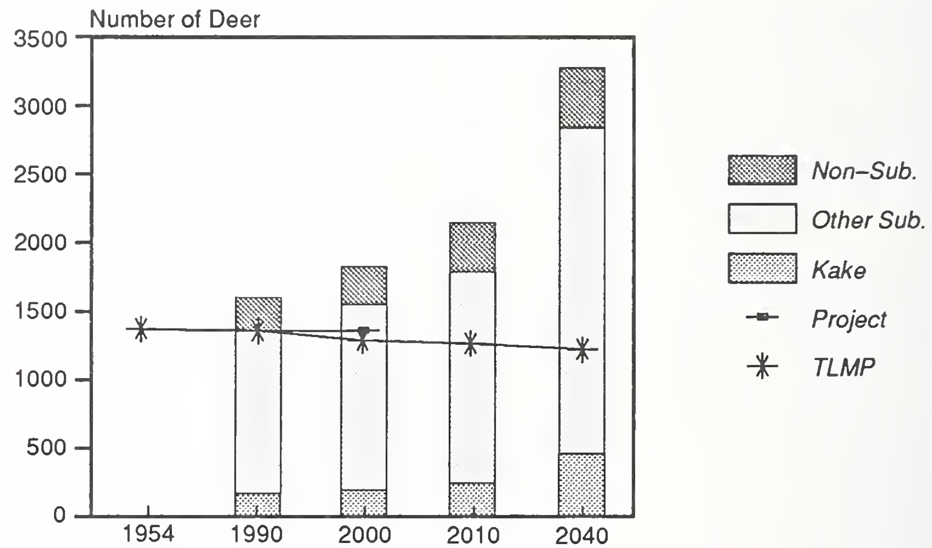
SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Kake

Kake residents did not report any deer harvests in the Project Area between 1987 and 1990. Figure 4-21 indicates that in the area primarily used by Kake residents to harvest deer, there are sufficient numbers of deer to meet current subsistence harvest demands. Neither the proposed project alternatives nor the implementation of the preferred alternative in TLMP is expected to significantly reduce deer habitat in this area. Because of projected increases in demand, however, the number of deer available to harvest is projected to be insufficient to meet subsistence harvest demands by the year 2000.

Figure 4-21

Kake: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.

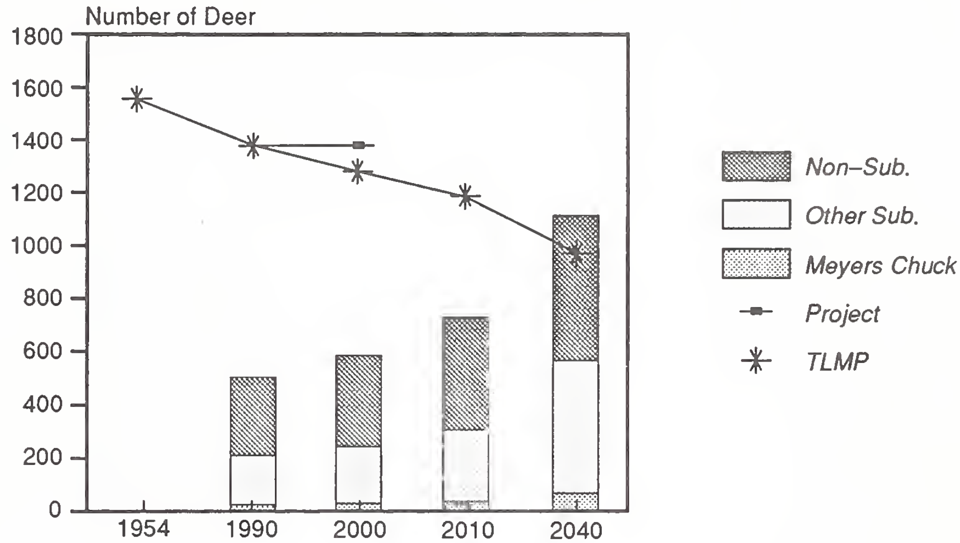
Note: See "Note" for Figure 4-15.

Based on the lack of projected direct effects on Kake deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Kake residents associated with the proposed actions.

Meyers Chuck

The projected effect of land used for subsistence hunting by alternative and by community is displayed in Table 4-90 and in Appendix E. The effect on acreage used by more than 5 percent of Meyers Chuck households is determined for each alternative. Meyers Chuck had a change of more than 2 percent resulting from proposed timber harvests in areas used by more than 5 percent of households. Meyers Chuck households only used the Corner Bay area for hunting (see Appendix E, Figure E-21 through E-25) and did not report harvesting deer in the Project Area from 1987 to 1990. Meyers Chuck residents did not harvest deer from the Project Area between 1987 and 1990. Therefore, Meyers Chuck residents are not expected to be significantly affected. Figure 4-22 indicates that in the area primarily used by Meyers Chuck residents to harvest deer, there are sufficient numbers of deer to meet subsistence and nonsubsistence demands under the preferred alternative of TLMP through 2010. Subsistence demands are projected to be met through the year 2040.

Figure 4-22
Meyers Chuck: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

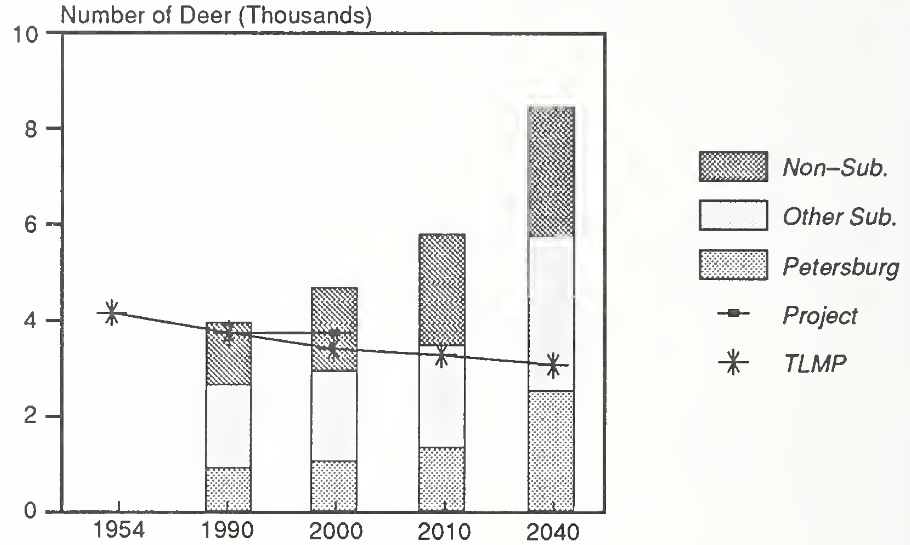
Based on the lack of projected direct effects on Meyers Chuck deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Meyers Chuck residents associated with the proposed actions.

Petersburg

Petersburg residents currently harvest four percent of their deer from Project Area WAAs 3308 and 3309. WAA 3308 is projected to have sufficient deer for subsistence and nonsubsistence uses under all project alternatives and under the preferred TLMP alternative through 2000 and sufficient deer for subsistence through 2010 (see Figure 4-4). Petersburg currently derives 90 percent of its harvest from areas which are estimated to have slightly less than a sufficient number of deer to meet current subsistence and nonsubsistence demands (see Figure 4-23). Increased demands are projected to produce a gap between supply and demand regardless of project or TLMP actions by the year 2000. Neither the project nor TLMP are projected to significantly affect the supply of deer for Petersburg residents.

Based on the lack of projected direct effects on Petersburg deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Petersburg residents associated with the proposed actions.

Figure 4-23
Petersburg: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Wrangell

Less than one percent of Wrangell's deer came from the Project Area between 1987 and 1990. Figure 4-24 shows no direct effect between any of the proposed project alternatives and the deer harvest capability in the area from which Wrangell residents derive 90 percent of their deer. Implementation of the preferred alternative of TLMP could reduce deer habitat below levels necessary to meet both subsistence and nonsubsistence demands by 2010 and below increasing levels of subsistence demand by 2040.

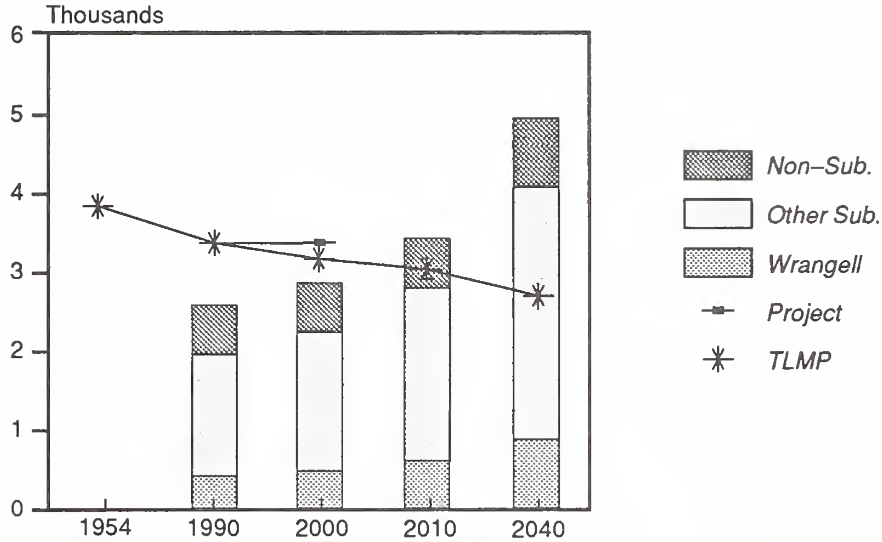
Based on the lack of projected direct effects on Wrangell deer harvesting in the Project Area, there is no significant possibility of a significant restriction of subsistence use of deer by Wrangell residents associated with the proposed actions.

Nonrural Communities

Nonsubsistence hunters account for 40 percent of the average annual harvest of deer in the Project Area. Thirty-seven percent of these deer are harvested by Juneau residents, comprising 8 percent of Juneau's average deer harvest. Forty-three percent of Juneau's average harvest is from WAA 3629.

This subsistence effects analysis finds that the proposed actions have a significant possibility of a significant restriction of subsistence use of deer primarily based on the projected effect of one or more alternatives on the estimated number of deer available to harvest in WAA 3629. The most likely mitigation measure to ensure adequate deer for subsistence needs is to restrict harvest of deer by nonsubsistence or nonrural communities. Regulation changes to deal with restrictions to subsistence in Project Area WAAs would affect nonrural hunters, particularly Juneau sport hunters.

Figure 4-24
Wrangell: Estimated Deer Available For Harvest and Harvest Demand



SOURCE: J. Kruse 1992. Information derived from ADF&G Deer Hunter Surveys 1987 to 1990; TLMP Supplement to DEIS Appendix.
Note: See "Note" for Figure 4-15.

Summary of Findings for Subsistence Use of Deer

One or more of the proposed actions present a significant possibility of a significant restriction of subsistence use of Sitka black-tailed deer by the residents of Tenakee Springs, Haines, Sitka, Skagway, and Angoon (see Table 4-82).

Table 4-82
Significant Possibility of a Significant Restriction of Subsistence Use of Sitka Black-Tailed Deer in the Project Area for All Alternatives

Direct and Indirect Effects from Proposed Actions

	WAA 3308	3309	3627	3628	3629	3630
Abundance and Distribution						
Tenakee Springs	No	No	No	No	Yes	No
Haines	No	No	No	No	Yes	No
Sitka	No	No	No	No	Yes	No
Skagway	No	No	No	No	Yes	No
All other communities	No	No	No	No	No	No
Access	No	No	No	No	No	No
Competition	No	No	No	No	No	No

Cumulative Effects from Past, Present, and Reasonably Foreseeable Forest Management Activities

	WAA 3308	3309	3627	3628	3629	3630
Abundance and Distribution						
Tenakee Springs	No	No	Yes	No	Yes	Yes
Haines	No	No	No	No	Yes	Yes
Sitka	Yes	Yes	Yes	No	Yes	No
Skagway	No	No	No	No	Yes	No
Angoon	Yes	No	Yes	No	No	No
All other communities	No	No	No	No	No	No
Access	No	No	No	No	No	No
Competition						
Angoon	Yes	No	Yes	No	No	No
Tenakee Springs	No	No	Yes	No	Yes	Yes
All other communities	No	No	No	No	No	No

SOURCE: Hartmann 1992b.

Note: "No" indicates that there would not be a significant possibility of a significant restriction. "Yes indicates that there would be a significant possibility of a significant restriction.

Abundance and Distribution of Other Subsistence Resources

Furbearers

Furbearers are currently being trapped in the Project Area (Tables 3-35 and 3-36). The Forest Service has no information on how many of the trappers harvesting marten, land otters, and other furbearers are from rural communities surrounding the Project Area. This evaluation assumes most of the trappers are from the surrounding rural communities.

Past timber harvest in the Project Area reduced marten habitat capability in WAAs 3308, 3627, 3629, and 3630 by 11 percent (Table 3-29). Pine marten habitat capability is assumed to reflect potential marten abundance and furbearer abundance. The *Wildlife* section analysis indicates that the proposed timber harvest would potentially reduce marten habitat capability an additional 2 percent.

Table 4-58 in the *Wildlife* section indicates that marten abundance under all alternatives will be sufficient to sustain the 1987 to 1990 average harvest of 22 marten. In fact, there would be habitat capable of supporting at least 578 marten with any of the alternatives.

Past timber harvest in the Project Area reduced otter habitat capability in WAAs 3308, 3627, 3628, and 3629 by 18 percent (Table 3-28). Proposed timber harvest alternatives would potentially reduce otter habitat capability an additional 1 percent. Roads left open for public use during trapping season may further decrease marten habitat capabilities.

Changes in local furbearer distribution are expected when second growth in harvested units reaches 25 years old. Timber harvest and regrowth of second growth in harvest units alter furbearer habitat-use patterns.

Waterfowl

A variety of waterfowl use the freshwater and saltwater habitats in the Project Area. Vancouver Canada goose was selected as an indicator of potential project effects on waterfowl. Vancouver Canada goose habitat capability is assumed to reflect potential Vancouver Canada goose abundance and waterfowl abundance. Chapter 4, *Wildlife* section, projects that potential habitat capability for Vancouver Canada goose would decrease 4 percent or less in the Project Area.

Timber harvest unit locations generally avoid important waterfowl areas. The estuary grass flats, beach fringe, and borders of inland lakes and streams would remain largely unaffected. There are no acres of beach fringe proposed for harvest. One percent or less of estuary fringe is proposed for harvest.

Brown Bear

Rural residents within ADF&G Game Management Unit (GMU) 4 and the residents of Kake are allowed to harvest brown bear for subsistence purposes. The Southeast Chichagof Project Area is within GMU 4. Table 3-35 in the *Wildlife* section displays the brown bear harvest in Project Area WAAs from 1987 to 1990. Brown bear are generally not considered a food source but rather a very limited use is made of parts of the bear for cultural purposes. Most of the brown bear taken in the Project Area are harvested by sport hunters (ADF&G harvest data).

Chapter 3, *Wildlife* section, notes that a 5 percent reduction in potential brown bear habitat capability has resulted from past timber harvest in the Project Area (Table 3-28). Brown bear habitat capability is assumed to reflect potential brown bear abundance. The overall reduction in brown bear habitat capability indicates the potential reduction in brown bear abundance from past activities has not been substantial.

The *Wildlife* section analysis in this chapter indicates that proposed timber harvest in the action alternatives would potentially reduce brown bear habitat capability another 2 percent. When added to the past effects, the habitat capability reduction would range from 4 percent for Alternatives B, D, E, and F to 3 percent for Alternative C. Roads left open to vehicle access for bear hunting following timber harvest will slightly decrease habitat capability.

Tables 4-57 and 4-71 in the *Wildlife* section of this chapter, show that proposed timber harvest in important brown bear habitats is generally low. Timber harvest in beach and estuary fringe habitats would potentially be zero percent and less than 1 percent, respectively. There would be no timber harvest in streamside riparian.

Changes in local brown bear distribution will occur in the vicinity of ongoing activities during the life of the proposed project as brown bears tend to avoid contact with people. Brown bears tend to move back into these areas after timber harvest is completed. Foreseeable changes in local brown bear distribution are expected when the age of the second growth on harvest units reaches about 25 years.

Table 4-67 in the *Wildlife* section indicates that brown bear abundance under all alternatives will be sufficient to sustain the 1987 to 1990 average harvest in Project Area WAAs. Currently the brown bear harvest in WAA 3309 is greater than the estimated habitat capability, indicating possible over-harvest and potential future displacement of hunters.

Marine Mammals

Federal law prohibits the taking of marine mammals by anyone other than Native hunters. There is no evidence that timber harvest activities have had any effects on marine mammals taken for subsistence nor do harvest activities have any effect on marine mammal habitat.

Salmon

Salmon are a major subsistence food harvested in the Southeast Chichagof Project Area. Several concerns about potential effects on the fisheries resource surfaced in public comments during scoping. Areas of specific concern were Sitkoh Creek, Sitkoh Lake, Kadashan, Basket Bay, Kook Lake, Crab Bay, and Corner Bay. Sitkoh Bay and Kadashan surfaced as concerns, even though no harvest is planned for those areas in this Final EIS.

The *Water and Fish* section of this chapter concludes that potential effects of the proposed timber harvest and road construction alternatives on salmon spawning and rearing habitat would be minimal or eliminated by applying the Forest Service standards, guidelines, and prescriptions described in detail in the Aquatic Habitat Management Handbook (USDA FSH 2609.24) and Soil and Water Conservation Handbook (USDA FSH 2509.22). All salmon spawning and rearing streams (Class I and Class II streams) near proposed timber harvest units are protected by buffers of at least 100 feet as prescribed in the TTRA. In addition, specific prescriptions for protecting salmon habitat were incorporated during the design of harvest and roads (see Appendices J and K for unit and road cards).

Based on the implementation of site-specific prescriptions developed during interdisciplinary meetings for protecting salmon spawning and rearing habitat, the analysis projects that the immediate and foreseeable effects on the abundance and distribution of salmon for subsistence uses in the Project Area would be insignificant.

Other Finfish

The action alternatives for the proposed project would have no immediate or foreseeable effect on other finfish habitat. Because there would be no effect on other finfish habitat, the abundance and distribution of those other finfish would not be affected.

Some impact on berry gathering could be expected fromthe alternatives.

Shellfish

The *Marine Environment and Log Transfer Facilities* section of Chapter 4 indicates that less than one percent of the marine and estuarine habitat in the Project Area would be affected by the construction of LTFs under any of the alternatives. Anticipated reuse of the LTF in Crab Bay, considered an important commercial and subsistence crabbing site, would affect an estimated 0.5 acres of the total 129 acres in Crab Bay. Oly Creek LTF site is also noted for its crab fishery. However, since the Oly Creek LTF will be a barge facility, no impacts are anticipated. In general, operation of LTFs result in small effects to benthic organisms.

Based on the limited impact the proposed LTF sites have on marine and estuarine habitat, crabs, and benthic organisms, the effect on the abundance and distribution of local crabs, clams, and other shellfish would not be measurable for purposes of subsistence. The project effects for the foreseeable future would be insignificant.

Other Food Resources

Other foods include plants such as kelp, goose tongue, a variety of berries, etc. Most traditional other food gathering occurs near beach and estuarine areas. Timber harvest units and roads proposed in action Alternatives B through F in the Project Area may infringe upon beach areas potentially used for other food gathering if gathering extends beyond 500 feet of the beach (there are no proposed harvest units within 500 feet of the beach). Road construction activities would improve access to berry picking sites that are now not reasonably accessible.

Since beach fringe and estuaries will not be significantly impacted by the proposed timber harvest and additional food gathering sites will be made available, the project effects and the foreseeable effects are not expected to substantially affect the abundance and distribution of other foods.

Firewood

The Forest Service has a free-use policy for firewood and timber and none of the proposed alternatives will have an adverse effect on the availability of firewood and personal-use timber. Construction of low-angle slides at the LTFs could make personal-use timber more available to individuals. The proposed LTFs for Crab Bay and Inbetween are low-angle LTFs.

Access

Access to historical subsistence-use areas may be affected where logging activities (such as LTFs, logging camps, and timber harvest) are located in the beach fringe. This is because traditional subsistence access is by boat to the beaches of the Project Area. The effect on access would probably be minor under all alternatives, because no beach fringe will be harvested in the Project Area and less than 1 percent of the marine and estuarine habitat will be impacted by logging activities.

New and rebuilt roads will provide access to areas that were not previously used for subsistence harvesting resources. Miles of road proposed for construction are shown in Table 4-86. Road access would favor harvest by logging camp residents who may have motorized vehicles available during the time camps are active. ATVs could be transported to the Project Area by boat and used for hunting and subsistence purposes where permitted. Residents from nearby communities, especially Sitka, Tenakee Springs, and Juneau are expected to utilize the roads for hunting.

To the knowledge of the Forest Service, there neither are nor have there ever been subsistence users who are dependent on the existing roads in the Project Area. Most of the roads constructed during past timber harvest in the Sitkoh Bay and Corner Bay area still provide access. Road management prescriptions developed for Project Area roads will take subsistence uses into consideration. Roads will be managed to restrict or prohibit use of vehicles, including ATVs, if monitoring indicates unacceptable impacts to subsistence resources.

Competition

Competition for subsistence resources in the Southeast Chichagof Project Area is an issue to residents of Tenakee Springs, Sitka, and Angoon and possibly other subsistence users. Tenakee Springs residents are concerned with road access through VCU 246 into WAA 3629 which is an important subsistence use area for Tenakee Springs and may increase competition from Sitka hunters. Community representatives of the Southeast Native Subsistence Commission, SENSC, voiced concern over the location of logging camps and the impact logging camp residents have on subsistence resources.

Increased competition could occur from logging camp residents on subsistence resources. Some future residents of the logging camps would be subsistence users. It is possible, though, that some camp residents would be Alaska nonresidents and nonrural residents. Most nonrural and Alaska nonresidents are employed seasonally by the logging companies and may leave prior to peak hunting times in late October through December, thus reducing their impact on subsistence resources. Although timber harvest has occurred in the Project Area previously, there is no documentation of impacts to subsistence users from the presence of logging camps.

Table 4-77 shows the distribution of deer harvest in Project Area WAAs among rural and nonrural communities. Data indicate there is competition with nonrural hunters. Over 50 percent of the deer are harvested by nonrural hunters in WAAs 3627, 3628, and 3629. This reflects competition by Juneau hunters in areas used by Tenakee Springs residents. Deer habitat capability in WAAs 3629 and 3630 is currently below the level considered adequate to sustain current rural and nonrural harvest. Deer habitat capability in WAA 3309 is currently below the level considered adequate to sustain current subsistence harvest (Table 4-78 and Figure 4-5).

The Federal Subsistence Board may use its authority to regulate nonrural harvest of deer and has authority to prioritize the harvest of deer among rural residents when necessary to protect the resource. This type of action, as prescribed by ANILCA, Section 804, may be necessary to ensure the availability of adequate abundance of deer needed by the rural communities using the Project Area whether or not the proposed actions are implemented. The current deer population level does not necessarily require restrictions on nonrural users.

There is no evidence to indicate that salmon, finfish, shellfish, or other food resources availability to subsistence users would be affected by sport or nonrural harvest. Any increase in competition from nonrural residents and Alaska nonresidents would not be substantial because of the availability of resources in the immediate vicinity and in the surrounding areas.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available nor would it be practical to evaluate displacement potential for individual households. Generally, there are sufficient lands available elsewhere within or outside the Project Area for subsistence gathering. Chapter 3 discusses the known uses of the Project Area by individual communities.

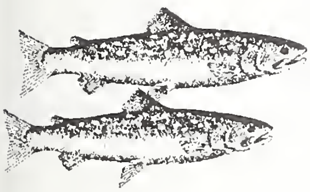
Because there may be a restriction on subsistence use of deer, a previous section of this evaluation discusses the availability of deer within the area historically used by specific communities. The evaluation indicates that for most communities there is adequate deer abundance within the area historically used by residents of each community to meet subsistence needs. Any displacement that may occur is likely to be to other areas within a household's or community's historical range. Furthermore, any displacement that may occur would likely be temporary until activities within the Project Area conclude in 3 to 7 years.

Cumulative Effects Summary

The Southeast Chichagof Draft EIS evaluates the cumulative effects on subsistence practices in the Project Area and other Forest Service lands associated with continued implementation of the TLMP. The evaluation of cumulative effects for subsistence resources determines whether or not future activities may restrict subsistence uses and identifies the rural communities that use the Project Area that would be most affected by a restriction.

Based on projected future timber harvest a total of approximately 29,254 acres will be harvested in the Project Area by 2011. The *Wildlife* section projects that this level of harvest would affect the habitat capability of several wildlife species. The changes in habitat capability could affect their abundance and distribution. Relative to habitat capability projected for 1961, by the year 2011, the potential deer habitat capability is projected to decrease cumulatively by 16 to 19 percent; the potential marten habitat capability is projected to decrease cumulatively by 13 to 17 percent; the potential brown bear habitat capability is projected to decrease cumulatively by 2 to 6 percent; the potential otter habitat capability is projected to decrease cumulatively by 18 to 20 percent; the potential Vancouver Canada Goose habitat capability is projected to decrease cumulatively by 7 to 15 percent (Table 4-71).

These potential decreases in abundance could increase competition for the species important for subsistence. However, the abundance of brown bear, marten, otter, and Vancouver Canada Goose appear to be sufficient to meet subsistence needs in the Project Area through 2011. Fish, shellfish, and other food resources should likewise be available to meet subsistence needs. Current habitat capabilities in WAAs 3309, 3629 and 3630 are below levels considered necessary to sustain the current harvest level for both subsistence and nonsubsistence communities. The total habitat capability from all Project Area WAAs is sufficient to meet the current demand from all subsistence communities that harvest deer from the Project Area. Future reductions in habitat capability and corresponding deer populations resulting from timber harvest will increase the potential conflict between subsistence harvest and nonsubsistence harvest of deer in the Project Area. In addition, to be successful hunters may need to make changes from their past hunting techniques or location or time of hunt. These possibilities reinforce the conclusion that the subsistence use of deer in the Project Area may be significantly restricted.



Actions on other lands surrounding the Project Area will also affect the abundance or distribution, access to, and competition for the subsistence resources harvested by rural communities using the Project Area. Table 4-83 displays the other timber sale projects in progress or being planned in the vicinity of the Southeast Chichagof Project.

Enough is known about foreseeable activities on other lands surrounding the Project Area to project that subsistence use of deer may be significantly restricted in the future. Figures E-47 and E-48 in Appendix E provide a regional perspective of the deer supply and demand in Southeast Alaska. Demand refers to deer harvest estimates while supply refers to the number of deer available for harvest according to habitat capability models. Figure E-47 portrays demand (1987-90 mean harvest) as a percentage of the 1990 deer supply (10 percent of the habitat capability) for each Wildlife Analysis Area (WAA). Where demand for deer exceeds 120 percent of the WAA supply, it is an indication that existing deer habitat is not sufficient to sustain present harvest levels. Baranof and Chichagof islands pose special management concerns. Figure E-47 shows that in many WAAs on Baranof and Chichagof islands the present supply of deer is not sufficient to sustain present demand. Within the Project Area, the supply of deer is currently not sufficient to sustain present demand in WAAs 3309 and 3629.

Figure E-48 projects deer demand versus supply 50 years from now. The model assumes that demand will increase in accordance with population projections and that habitat capability will be reduced as projected by this and other timber harvests scheduled in TLMP's preferred alternative. In the year 2040, the map shows that, with the exception of WAA 3628 (Kadashan drainage), no WAA within the Project Area will contain enough habitat to supply deer in sufficient quantities to meet demand. Cumulatively under this scenario, by the year 2040 demand will exceed the supply of deer (i.e. be greater than 120 percent of the supply) in every WAA on Baranof and Chichagof islands except WAAs 3418 and 3628. Subsistence demand

for deer alone will exceed the supply of deer in every WAA on Baranof and Chichagof islands except WAAs 3418, 3628, 3629, and 3732. Given the cumulative effects on surrounding WAAs, hunting pressure may become more concentrated in WAAs where the supply of deer remains adequate, thus leading to greater increases in demand in these WAAs than projected on Figure E-48.

Subsistence use of salmon, other finfish, shellfish, or other resources in the Project Area is not expected to be significantly restricted.

Table 4-83

Proposed Timber Sale Projects on the Chatham Area

Project	Location	Projected Volume	Projected Date
Ushk Bay	SW Chichagof Island Ushk Bay, Deep Bay	89 MMBF	1994
Eight Fathom	N. Chichagof Island Icy Strait	127 MMBF	1995
NW Baranof Island	Fish Bay Katlian Bay	127 MMBF	1996

SOURCE: Forest Service 1991b.

Resource Findings

The above analysis leads to the conclusion that the actions proposed in Alternatives A1 through F do not present a significant possibility of a significant restriction on subsistence use of brown bear, furbearers, waterfowl, marine mammals, salmon, other finfish, shellfish, or other food resources in the Project Area (Table 4-84 and 4-85). This finding is based on the potential resource effects by the three evaluation categories: abundance and distribution, access, and competition.

Table 4-84

Significant Possibility of a Significant Restriction of Subsistence Use of Fish Resources

	Alternative						
	A1	A2	B	C	D	E	F
Abundance or Distribution	No	No	No	No	No	No	No
Access	No	No	No	No	No	No	No
Competition	No	No	No	No	No	No	No

SOURCE: Hartmann 1992b.

Note: "No" indicates that there would not be a significant possibility of a significant restriction. "Yes indicates that there would be a significant possibility of a significant restriction.

Table 4-85
Significant Possibility of a Significant Restriction of Subsistence Use of Other Resources

	Alternative						
	A1	A2	B	C	D	E	F
Abundance or Distribution	No	No	No	No	No	No	No
Access	No	No	No	No	No	No	No
Competition	No	No	No	No	No	No	No

SOURCE: Hartmann 1992b.

Note: "No" indicates that there would not be a significant possibility of a significant restriction. "Yes indicates that there would be a significant possibility of a significant restriction.

Determinations

Section 810 (a) (3) of ANILCA requires that when a significant restriction may occur, determinations must be made in regard to whether:

- Such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of public lands;
- The proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use and occupancy, or other disposition;
- Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Necessary, Consistent with Sound Management of Public Lands

The alternatives proposed in the Southeast Chichagof Draft EIS have been examined to determine whether they are necessary, consistent with sound management of public lands. In this regard the National Forest Management Act of 1976, the ANILCA, the Alaska Regional Guide, the TLMP, the TLMP 1985-86 Amendment, the Alaska State Forest Practices Act, and the Alaska Coastal Zone Management Program have been considered.

The ANILCA placed an emphasis on the maintenance of subsistence resources and lifestyles. However, the Act also required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest and left the APC contract in place. The TTRA removed the 4.5 MMBF requirement from ANILCA but directed the Forest Service to seek to meet market demand and the market demand for the planning cycle and left the volume requirements and contract area of the APC contract in place. Demand for timber from the Tongass National Forest is expected to remain near 400 MMBF per year from 1990 to 2010.

The Alternatives presented here encompass five different approaches that would produce the resources that would best meet the needs of the American people, help achieve multiple use management objectives in the TLMP and meet APC contract obligations. All of the alternatives involve some potential to impact subsistence uses. There is no alternative that will meet APC contract requirements and TLMP objectives and yet avoid a significant possibility of subsistence restrictions somewhere in the Forest. Therefore, based on the analysis of the information presented in this document on the proposed alternatives, these actions are necessary and consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Purpose of the Proposed Action

Appendix A addresses the availability of other lands within the APC contract area suitable for the timber harvest. Much of the Tongass National Forest is used by one or more rural communities for subsistence purposes for deer hunting. The areas of most subsistence use are the areas adjacent to existing road systems, the beaches, and the areas in close proximity to communities. Within the Project Area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as soil and water protection, high value wildlife habitat, economics, visuals, or unit and road design. Effort was taken to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas and none will be harvested under any of the proposed alternatives.

The impact of viable timber harvest projects always includes alteration of old-growth habitat which in turn always reduces projected habitat capability for old-growth-dependent subsistence species. It is not possible to lessen harvest in one area and concentrate it in another without impacting one or more rural communities' important subsistence use areas. In addition, harvestable populations of game species could not be maintained in a natural distribution across the Forest if harvest were concentrated in specific areas. A well distributed population of species is also required by the Forest Service regulations implementing the National Forest Management Act (NFMA).

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources

Reasonable steps to minimize impacts on subsistence have been incorporated in development of the alternatives and project design criteria. During development of alternatives, an effort was made to minimize activities that could adversely impact important subsistence use areas. Project design criteria called for locating roads and units outside of important subsistence use areas such as the beach fringe, estuary fringe, and riparian areas adjacent to salmon streams.

Final EIS Conclusions

The Final EIS for the Southeast Chichagof Project includes a final determination about the significant restriction on subsistence use that may result from implementation of the selected alternative. This determination also will be discussed in the Record of Decision (ROD). Below is a summary of the Final EIS evaluation and findings. Additional mitigation, such as road closures and bear/conflict resolution, are proposed as part of each action alternative.

1) The potential foreseeable effects from the action alternatives in the Southeast Chichagof Project do not present a significant possibility of a significant restriction of subsistence uses of brown bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, and other foods.

2) There is a significant possibility of a significant restriction of subsistence use of deer in the Project Area for Tenakee, Haines, Sitka, Skagway, and Angoon residents regardless of which alternative is implemented.

3) Among the communities using the Project Area WAAs, there is sufficient habitat capability to meet subsistence needs through the year 2000 in the areas throughout the region where Tenakee, Angoon, Petersburg, Wrangell, and Meyers Chuck residents harvest 90 percent of their community's deer.

4) Areas used by Sitka, Haines, Hoonah, Skagway, and Kake are not sufficient for all subsistence demands through the year 2000. The gap between supply and demand is primarily attributable to increased demand.

Hearings

On the basis of findings of this analysis and under the provisions of ANILCA, subsistence hearings were held as follows:

June 15, 1992	7 to 9 pm	Sitka, AK
June 16, 1992	7 to 9 pm	Haines, AK
June 17, 1992	7 to 9 pm	Skagway, AK
June 18, 1992	7 to 9 pm	Tenakee Springs, AK
June 19, 1992	7 to 9 pm	Angoon, AK
June 23, 1992	7 to 9 pm	Tenakee Springs, AK
June 24, 1992	7 to 9 pm	Angoon, AK

In addition, informational open houses were held in the afternoon before each hearing. Letters announcing the hearings were sent to the Federal Subsistence Board, Alaska Department of Fish and Game, Regional Fish and Game Advospru Councils, and to Local Fish and Game Advisory Committees. Notices were posted in Sitka, Haines, Skagway, Tenakee Springs, Angoon, and Juneau. Announcements were placed in newspapers and on the radio. Both verbal and written testimony were received at the hearings. Written testimony submitted after the hearing date was accepted if postmarked by June 29, 1992. All ANILCA Section 8 subsistence testimony received is displayed in Appendix D.

Roads

Long-term (greater than 10 years) or forest development roads are developed and operated to provide either continuous or periodic access for long-term land management and resource utilization needs. These roads are constructed under either the terms of timber sale contracts or by means of formal road construction contracts. Between periods of commercial timber haul, these roads will be maintained as prescribed by their RMOs for future resource access needs. Maintenance strategies may range from the roadway being continually graded and kept open for incidental traffic, to intermittent periods of closure during which the encroachment of natural vegetation is allowed. In all cases, the drainage structures will be maintained to protect natural resources. During periods of closure, those repairs needed to protect the investment and preserve structural integrity will be performed. Along the roadway, maintenance would be performed only as needed to facilitate restoration of the roadway for future use and to alleviate erosion or sedimentation. Such maintenance would include the application of grass seed to the roadbed.

Short-term (10 years or less) roads are developed and operated for a limited period of time and cease to exist as a transportation facility after the purpose for which they were constructed is completed. When the need for access provided by these roads has ended, the drainage structures will be removed and the roadbed will be waterbarred and seeded as required by the timber sale contract. Short-term roads will be included in the forest transportation inventory system (TIS) and will be maintained as prescribed by their Road Management Objectives (RMOs) until the purpose for which they were constructed is completed.

The effects of road construction required to support the timber harvest under the alternatives are carefully analyzed in deciding on a preferred alternative.

Temporary roads are those constructed by the timber purchaser to harvest timber on a short-term, one-time basis. These are not considered to be part of the permanent transportation network. Drainage structures are removed from temporary roads. It will also be grass seeded and waterbarred to prevent erosion and so that it can be reclaimed by forest vegetation when the activities for which it was constructed are completed.

Table 4-86 displays the existing and planned Forest development roads and temporary roads by mile, for each alternative. Not all previously existing roads would be needed for this project.

Table 4-86
New Construction, Reconstruction, and Temporary Roads (in miles)

	Alternative				
	B	C	D	E	F
Long-term Road Construction	63.8	25.5	62.9	51.3	34.6
Short-term Road Construction	3.3	0	0	2.8	2.2
Road Reconstruction	13.5	23.2	23.8	14.5	21.8
Temporary Road Construction	29.1	14.7	16.5	21.0	18.9
Total Road Activity	109.7	63.4	103.2	89.6	77.5

SOURCE: Kosak and Allio 1992.

Note: This information derived from Chatham Area GIS database.

The environmental consequences from forest development roads can be described in two general concepts: (1) road density, and (2) acres of forest removed from natural resource production by roadway clearing activities. Road density is the number of miles of forest development roads in a square mile. Generally, the higher the road density, the greater the impact on the environment. Table 4-87 displays current road densities and projected road densities by alternative. The direct, indirect, and cumulative effects of roads on wetlands, soils, water, fish, wildlife, cultural, economic, social, subsistence, recreation, visual, lands and minerals resources are examined in those particular contexts in this chapter.

Table 4-87

Road Density Table: Miles of Road Per Square Mile of Land Base

	Alternative					
VCU	A1/A2	B	C	D	E	F
227	0.0	0.0	0.0	0.0	0.0	0.0
228	0.0	0.0	0.0	0.0	0.0	0.0
229	0.0	0.0	0.0	0.0	0.0	0.0
230	0.27	0.94	0.94	0.62	0.78	0.92
231	0.0	0.39	0.22	0.28	0.19	0.0
232	0.0	0.71	0.0	0.45	0.56	0.0
233	0.42	0.89	0.75	0.78	0.85	0.75
234	0.68	0.78	0.78	0.78	0.78	0.78
235	0.11	0.11	0.11	0.11	0.11	0.11
236	1.17	1.17	1.17	1.17	1.17	1.17
237	0.0	0.0	0.0	0.0	0.0	0.0
238	1.02	1.02	1.02	1.02	1.02	1.02
239	0.81	0.81	0.81	0.86	0.86	0.81
240	0.0	0.0	0.0	0.91	0.33	0.0
241	0.60	0.60	0.85	0.91	0.60	0.88
242	0.96	0.96	0.96	1.03	0.96	0.96
243	0.88	0.88	0.88	0.88	0.88	0.88
244	0.66	0.66	0.66	0.66	0.66	0.66
245	0.66	0.83	0.66	0.69	0.67	0.67
246	0.0	0.75	0.0	0.63	0.67	0.64
Average Road Density	0.4	0.6	0.5	0.6	0.6	0.5

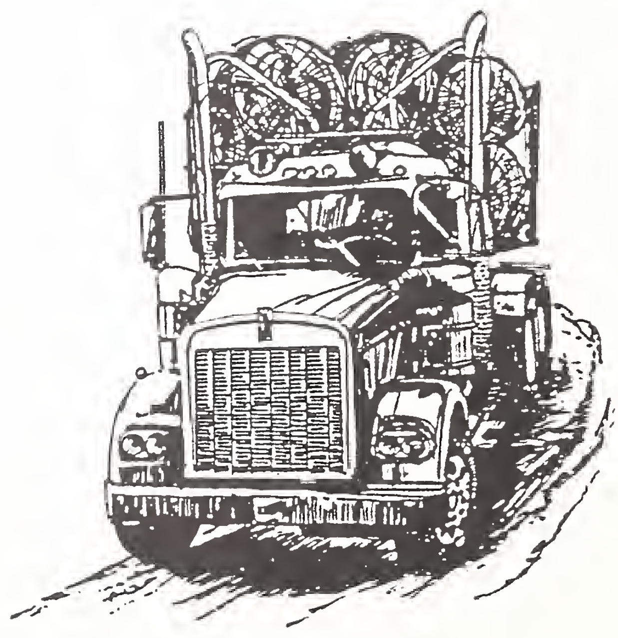
SOURCE: Kosak and Allio 1992.

The clearing widths required for forest road development are dictated by the steepness of the terrain and the road design standard. Steeper terrain generally requires wider clearing limits resulting in a greater number of acres cleared or removed from natural resource production. Access roads yield an average of 6 acres of clearing per mile of road. Long-term roads will be maintained for future resource access, so land cleared for these roads will be removed from natural resource production. Upon completion of logging, short-term roads and temporary roads would have their drainage structures removed, the roadway would be seeded to control erosion, and the road would be allowed to deteriorate so it can once again return to natural resource production. Table 4-88 compares road clearing by Alternative. RMOs for each road segment for each alternative are included as part of Appendix F, Tables F6 to F11.

Table 4-88
Road Clearing

VCU	Alternative A1/A2	B	C	D	E	F
Long-term Road	1,007	382	153	377	306	206
Short-term Road	0	20	0	0	19	15
Temporary Road	0	175	89	100	126	113
Total acres	1,007	577	242	477	451	334
Accumulated with Existing	1,007	1,654	1,319	1,554	1,528	1,411

SOURCE: Kosak and Allio 1992.



Marine Environment and Log Transfer Facilities

Southeast Alaska, the Tongass National Forest, is largely made up of islands with isolated villages and towns that can only be accessed by boat or airplane. There are very few inter-island road connections, and islands are not connected. Therefore, when activities such as timber harvest are planned on the forest, logging camps, and LTFs, along with sort yards, are established to efficiently harvest timber at remote locations. The Southeast Chichagof Project Area is one of these isolated areas without interconnecting roads between bays. There is no connection to the larger towns where the pulp and lumber mills are located. Logs are transported by log rafts or by barging over the ocean to the mills in Southeast Alaska. LTFs can be either low-angle slides or bulkhead type structures used for transferring logs from land transportation (trucks) to salt water or by transferring logs directly onto barges.

A total of two logging camps will be maintained in this plan. The two camps are operational (Corner Bay and False Island). The roadbuilders will utilize these camps and may have a 20-person floating camp at Crab Bay

Existing sort yards are in place in four of the five LTF sites being considered in the Southeast Chichagof Project Area. They range from operational to alder covered. The sort yards at False Island and Corner Bay are operational. At Oly Creek, Inbetween Creek and Crab Bay, the sort yards are alder covered and will need to be cleared. A sort yard proposed at Oly Creek under Alternatives D, E, and F has not been constructed.

The Southeast Chichagof plan considers a total of five sites for LTFs. Two of the sites, Corner Bay and False Island, are existing LTFs. Crab Bay is existing and needs reconstruction to install a slide facility. The LTF in VCU 230 (Inbetween) has been used in the past as a temporary LTF. The USFS and National Marine Fisheries Service (NMFS) recommend this site be used only as a temporary LTF. The other site is Oly Creek, where a new site is proposed for construction. Table 4-89 shows which LTFs would be needed for each of the alternatives.

Table 4-89
Log Transfer Facilities

	Alternative				
LTF	B	C	D	E	F
False Island	X	X			X
Corner Bay		X	X	X	X
Crab Bay		X		X	
Oly Creek			X	X	X
Inbetween		X		X	X

SOURCE: Kosak and Allio 1992.

Two general types of facilities and their associated effects on the environment are analyzed. The first type of LTF is a low-angle slide. The amount of riprap and fill (used to make the facility) varies from 0.25 acres to 0.5 acres. Accordingly, the direct impact on the intertidal area also varies.

The second type of facility considered in this analysis is a bulkhead facility. The bulkhead facility can either be used in conjunction with a single or double A-frame log entry method or with direct loading of barges from the bulkhead. As a result of the bulkhead construction and variation in quantity of fill (from 0.1 acres to 0.25 acres), this type of facility varies in direct impact to the intertidal area.

Of the two designs, the slide design is less expensive to construct, maintain, and operate. The cost of constructing a bulkhead facility is approximately three times that of constructing of a low-angle slide. Maintenance of a timbered bulkhead facility would require replacement at approximately 10-year intervals, thereby substantially increasing the costs of future harvests (Faris and Vaughan 1985). Concrete bulkheads can be substituted for timbered bulkhead structures, also at a higher cost.

Low–angle slide facilities as shown here at Long Island are the least expensive to construct, maintain, and operate.

Historically, the Peril Straits area is subjected to Taku winds (winds reaching up to 100 miles per hour), which intermittently cause windthrow to standing timber. It is reasonable to expect that windthrow will occur intermittently in the future. Salvage of windthrown timber is usually accomplished by small business operators who have substantially smaller investments in equipment. A low-angle slide facility would thus better serve smaller operators than would a bulkhead or an A-frame facility, as the latter requires large, expensive equipment to operate.

Bulkhead facilities are particularly effective at locations where there is deep water. Initially, they create a smaller affect (because of rock fill) on the intertidal area, but have a higher operation and maintenance cost (Faris and Vaughan 1985). A bulkhead/barge facility is proposed at the Oly Creek site to cope with the wind and wave action in Peril Strait and the lack of a sheltered bay necessary to construct log rafts.

Potential impacts from proposed LTFs are analyzed for both marine and estuarine systems. In both systems, the areas are subdivided into the subtidal and intertidal zones. The intertidal zone is exposed and flooded by tides and includes the associated splash zone, while the subtidal zone is continuously submerged (Cowardin et al. 1979). In general, the estuarine systems are more productive than marine systems, and the intertidal and shallow subtidal area is the most productive portion of the coastal sub-zones (Odum 1970).

Direct Effects

Direct effects to the marine environment are those that occur in the same time or same place as the current timber harvesting and road constructing activities. In terms of LTFs, direct effects are limited to the intertidal area affected by rock fill and either the intertidal or subtidal areas potentially affected by accumulation of bark debris. In most cases, the intertidal zone affected by rock fill for the facility would range from 0.1 acres up to 0.5 acres. Bark debris accumulation varies from location to location depending on slope of the benthic bottom, plus tidal and wave action. Where bark debris information is available, it is noted in tables. Where that information is not available, the impacts are estimated to be comparable to LTFs nearby or approximately 1.96 acres (a regional average based on a study of 32 LTFs in Southeast Alaska) (Faris and Vaughan 1985).

Estuarine and Marine Systems

The importance of loss of productivity in an estuary because of accumulation of bark debris is difficult to assess. In large estuaries, the importance of this loss is diminished because the percentage of unaffected area is large compared to the amount lost. In a small estuary (or in a bight or cove within a large estuary), the loss of productivity may cause deterioration in the remaining areas, at least temporarily (Schultz and Berg 1976). The basis for comparing LTFs and the possible effects on the marine environment were derived from subtidal surveys conducted jointly by the USFWS and NMFS.

Marine life forms are directly affected by coverage of bark debris or by rock fill; this displaces natural habitat. Some species, primarily motile species, were seen in the immediate area and appeared not to be affected by debris (Schultz and Berg 1976). Bark sloughed during transfer and storage can accumulate, covering the bottom and smothering habitat and sessile organisms. There are indications that water quality around or in bark accumulations is also affected to varying degrees. The amount of dilution or flushing is the main factor determining environmental effect near the transfer or storage sites (Faris and Vaughan 1985). The significance of this source of water pollution depends on the quantity and types of logs stored, the length of storage, and the character and flow of the water at the transfer site (Schaumberg 1970). Toxic substances, occurring as leachates from bark, precipitate in salt water; however, leachates do not appear to be a major problem in open water or where good circulation exists (Sedell and Duval 1985).

In general, areas within estuaries are more sensitive to disturbance from LTFs than those areas located on marine systems. Species diversity is an indication of quality of habitat, which means locations with greater diversity would indicate better habitat (Schultz and Berg 1976). LTFs located in areas with higher numbers of species generally exhibit higher value habitat than those with lower numbers of species present along the transect.

At all investigated locations, the species found along the estuarine and the marine system transects are commonly found throughout the coastal waters of Southeast Alaska. Many species range as far south as California and Mexico.

Each of the estuaries affected are larger than 100 acres and would have greater ability to absorb impacts to a minute area within the individual estuary (Schultz and Berg 1976) (Table 4-90). Species diversity for each of the estuary locations range from 11 to 18 species along a 100-meter transect (see Appendix H). At each of the proposed LTF locations, the percentage of estuarine benthic habitat subject to direct effects would be less than 1 percent. This small percentage represents a minor amount of the total available estuarine habitat (Kosak and Allio 1992).

Table 4-90
Log Transfer Facilities and Estimated Direct Effects to the Estuarine Marine System

VCU	LTF Name	Estuary Acres	Shoreline Miles	No. of Species	Facility Type	Estimated Acres of Impact Fill +	Bark=	Total
230	Inbetween	103	16	15	Slide	0.5	0.9	1.4
233	Crab Bay	129	18	18	Slide	0.5	0.0	0.5
236*	Corner Bay	227	11	**	Slide	0.0	1.7	1.7
245*	False Island	137	44	**	Bulkhead	0.0	0.9	0.9
245	Oly Creek	121	44	11	Bulkhead	0.3	0.0	0.3
Total		717	133			1.3	3.5	4.8

Percent of Estuary Affected = 4.8 / 717 = 0.007 or less than 1 percent.

SOURCE: Kosak and Allio 1992.
* Indicates existing LTFs.
** Indicates no species count on record.

As shown in Tables 4-89 and 4-90, loss of estuarine and marine habitat at any one or all of the LTF sites represents less than 1 percent and is considered very minor for all action alternatives. There would be no direct effects from LTF development for Alternatives A1/A2.

Fish

The effects of LTFs on fish resources have not been quantifiably demonstrated. It is unlikely that any effects on returning adult fish would occur unless an LTF or raft storage area were immediately adjacent to an anadromous fish stream and caused blockage of entry into the stream. None of the proposed LTFs would block Class I streams. Juvenile pink and chum salmon that spend several months immediately after migration out of the streams in protected bays and coves would more likely be affected by activities in the marine environment. These small fish are highly mobile as they actively feed on marine invertebrates. Some of their

preferred food items live on the bottom surface. Bark accumulation and the area under the embankment of a standard facility eliminates a small portion of the habitat of those food items; however, it is unlikely to cause measurable adverse consequences.

There is no formal documentation that LTF structures or activities associated with their use conflict with commercial fishing near the facility. If a facility were located in a small bay or cove, it is remotely possible that there could be difficulty maneuvering around log rafts to get to favored fishing sites. None of the proposed facilities would limit commercial fishing operations. No adverse consequences on commercial fishing are anticipated as the result of LTF locations.

Camps associated with an LTF site can cause additional use of fish and marine resources. The competition for resources at or near logging camp locations would probably increase slightly. There is currently little or no information to indicate that resource allocation problems have occurred as the result of logging camps. The Boards of Fish and Game can control the amount of harvest by setting bag limits, shortening season lengths, or by instituting a complete closure of a fishery. If resource problems arise because of increased resource pressure that results from the presence of a logging camp, the Forest Service would aid the ADF&G in attempting to resolve the problem. However, it is unlikely that an allocation or use would progress far enough to cause adverse consequences on fish or marine resources.

Logging camps like this one at Corner Bay will increase the use of fish and marine resources.

Wildlife

From a wildlife perspective, there are two types of effects associated with an LTF and camp. First, there is the potential loss of wildlife habitat as a result of clearing activities for the camp, sort yard, and associated facilities. Second, and more importantly, there is the disturbance to wildlife as a result of increased human activity associated with a camp. Both of these effects are addressed in more detail in the *Wildlife* section of this chapter.

The amount of habitat lost is relatively minor. Whenever possible, camps and sort yard facilities are located away from the highest quality habitat. The difference between a slide and a bulkhead facility are inconsequential in their effects on wildlife. The objectives are to avoid eagle nest sites and estuarine habitat.

Wildlife may be adversely affected by human activity associated with the camps and facilities. This includes disturbance of wildlife use patterns, increased harvest, and increased human-bear encounters. These effects are minimized when the camp facilities are on a barge (floating camp) as opposed to being located on the uplands. The overall effects of disturbance of the wildlife use patterns are expected to be minor. Most wildlife species generally adapt quickly to increased human activity.

Indirect and Cumulative Effects

All action alternatives project the need for LTFs in the foreseeable future. It is likely that these facilities, with the exception of Inbetween Creek, would remain in place through the end of the contract period as opposed to pulling the structures and putting them back in place for future harvests. Normal maintenance would occur, similar in objective to road management.

During the scoping process, there was strong public preference for the Forest Service to reuse existing LTF locations rather than construct new ones. This is considered an indirect effect as opposed to a direct effect. Two of the proposed LTF locations would satisfy this public concern. These locations are Inbetween and Crab Bay.

One new LTF, the Oly Creek site, would be constructed if Alternatives D, E, or F were selected for implementation.

The indirect effects of reconstructing an LTF on a previous site would be potential accumulation of more bark on top of the area currently covered with bark (if any). Area of bark coverage is not expected to increase beyond those currently noted in either the 1976 or the 1991 subtidal surveys.

Recolonization rates of old sites are not known. It is also uncertain whether or not the habitat is recolonized by the original species present before bark deposition occurred. The length of time that debris remains in place after a site becomes inactive is not known and is likely to be highly variable due to differences in wave and tidal action.

Rock fill for either a slide or a bulkhead facility would not increase or decrease based on log facility use, and those effects are addressed in the *Direct Effects* section. Bark depth may increase slightly, but area coverage would not be expected to increase with reuse of the old LTF sites. At Oly Creek, where a new facility is being proposed, there would be no bark accumulation as this site is proposed to be a barge facility.

Long-term Productivity

This section compares the short-term effects of developing LTFs in the intertidal area to long-term accessibility (for timber management) and productivity in the area. Without a means to dump logs into salt water, the long-term opportunity to manage the uplands for commercial timber is lost. If LTFs were not approved by permitting agencies, the volume tributary to those facilities would not be available to meet contractual obligations.

It is assumed that other resources would have similar management opportunities with or without access to the uplands from salt water (by an LTF). Table 4-91 compares the number of acres potentially affected by each LTF to the number of acres of suitable timber tributary for each location. It also shows the range of volumes estimated to be transferred at each location for the present and foreseeable future. The range of volumes represents volumes from the current alternatives and the projections for the foreseeable future, rounded to the nearest MMBF. The last column shows the estimated volumes scheduled by the TLMP to meet the allowable sale quantity over the rotation.

Short-term use of 1.3 acres of estuarine habitat, all of which occurs in large estuaries, would provide access to 21,049 acres of land suitable for timber production. This roughly equates to between 138 MMBF and 174 MMBF to be available to meet commitments to the APC contract in the present and foreseeable future.

Table 4-91
Comparison of Short-term Uses to Long-term Productivity for the Estuarine System

VCU	LTF Name	Acres Estimated Impact	Acres Tentatively Suitable	Range of Harvest 1991-2011 MMBF	TLMP Schedule Rotation MMBF
230	Inbetween	0.5	7,615	40 - 56	99
233	Crab Bay	0.5	8,197	51 - 65	247
245	Oly Creek	0.3	5,237	47 - 53	11
Total		1.3	21,049	138 - 174	357

SOURCE: Anderson 1992.

Rock fill or riprap, though it may cover the current habitat, also provides habitat for future colonization by species similar to those which already occur (Forest Service 1986b). Through the years, either the rock fill or the regraded beach at each LTF location would be expected to recolonize with species similar to those currently occurring, thereby maintaining productivity of the marine habitat.

Recreation

Under all alternatives, the Southeast Chichagof Project Area has the potential to provide a wide range of recreational opportunities, including a variety of activities, settings, and experiences. The change in the recreational setting, because of timber harvest and/or road construction activities, may affect the recreational experience and, therefore, overall satisfaction for the forest visitor. People participate in recreation activities in specific areas for a variety of reasons and with a variety of expectations. Visitors seeking a primitive recreational experience may not be satisfied in an area with active timber management. On the other hand, visitors who do not require a natural setting for their recreation activities may appreciate the opportunity to use a newly constructed road for access into the area.

This characteristic of the recreation resource makes it difficult to project the environmental consequences of any proposed action. Surveys suggest that visitors to and residents of Southeast Alaska seem to value opportunities for remote, uncrowded wildland and marine outdoor recreation. Even among these user groups, however, preferences for settings may be quite different. Fortunately, the specific recreation opportunities that are available in the Southeast Chichagof Project Area vary greatly.

The principal method used for analyzing the environmental consequences of the proposed activities on the recreation resource is based on this desire or expectation of forest visitors for specific types of experiences and settings. These expectations can be represented by the Recreation Opportunity Spectrum (ROS). The effects on the recreational resource can be assessed by analyzing the change in each ROS class that would result from the proposed actions under each of the alternatives. A difference in the ROS class would reflect a change in the recreational setting, recreational activities, and recreational experiences offered in the area. (See Chapter 3, *Recreation*, or the Glossary for more information on ROS.)

The timber harvest activities may affect the nature of the recreationist's experience.

A second measurement of the effects of the proposed actions is the change which might occur in the physical or social characteristics of specific Recreation Places (see Chapter 3, *Recreation*, or the Glossary for more information on Recreation Places). It is these specific inventoried places and the quality of their settings that constitute a large portion of the recreation opportunities in the Southeast Chichagof Project Area. Therefore, the degree of change in the condition of the setting and the recreation opportunities available is an important measure of the effect of an alternative on the recreation resource.

Preferences of recreationists vary greatly. However, past uses, trends, and surveys can be analyzed to indicate the general nature of recreational users in Southeast Alaska. Sources for these trends and surveys include the Supplement to the DEIS for the TLMP Revision (1991b); State Comprehensive Outdoor Recreation Plan (1988); Alaska Public Survey (Alves, Dignan and Kerr 1979); discussions with providers of commercial services such as outfitters, guides, and air taxis; and discussions with recreational users. While some of the sources may be broad in the context of applying it to a site specific area such as the Southeast Chichagof Project Area, the findings of the sources are generally consistent. Thus, some generalization can be made of the probable consequences of the various alternatives.

Direct and Indirect Effects

Recreation Opportunity Spectrum

The overall consequence to the Southeast Chichagof Project Area, as far as the ROS is concerned, is a general loss of Primitive (PRIM) and Semiprimitive Nonmotorized (SPNM) recreation opportunities and an increase in Roaded Modified recreation opportunities for all action alternatives. These changes in ROS are substantial for the Southeast Chichagof Project Area. However, the Project Area contains only a small amount of the total recreation opportunities on the Tongass National Forest, and there are other similar recreation opportunities nearby. As a result, this shift in recreation opportunities from Primitive and Semiprimitive Nonmotorized to Roaded Modified (RM) is a minor impact for each alternative when viewed forestwide.

The increase in roaded recreation opportunities will not necessarily result in a corresponding increase in roaded recreation. Recreational use of these roaded recreation opportunities will be limited because the logging roads are not connected to a public road system or the Alaska Marine Highway System. In addition, this shift to a motorized setting is not estimated to result in a net loss of nonmotorized recreation. This is due to the availability of other nonmotorized recreation opportunities nearby, both inside and outside the Project Area. Many activities currently occurring in nonmotorized settings will likely be displaced to other areas, although other activities such as late season hunting (when logging is not active) may continue.

Areas undergoing active road construction and timber harvest would be classified as a Roaded Modified ROS class. This modification in recreational setting would continue after operations cease, although encounters with other people will not be great. The change in recreational setting would most likely cause a change in the recreational activities in the area.

With the reconstruction and expansion of the road network for new timber harvest, certain areas could be available or managed for motorized recreational use. However, even roads that are closed by waterbarring could be used by all-terrain vehicle (ATV) users for 5 to 7 years before the brush and alder would make the roads impassible. The increased access, especially if accompanied by motor vehicle or ATV use, could increase pressure on game species and sport fishing.

Table 4-92 displays the changes in ROS class for each alternative as an effect of timber harvest or road construction activities. It displays these changes in acres and as a percentage of the total Project Area. Alternatives A1 and A2, the no-action alternatives, reflect the existing situation. This table provides the best overall picture of the changes which will take place in the recreation opportunities for the Southeast Chichagof Project Area. All of these changes would remain until the natural appearance of the specific area returns, at least through the end of the rotation (Forest Service 1991b). There will be a slight improvement in the recreation opportunities once active logging operations cease; however, the alteration of the physical and biological setting is a long-term effect.

Table 4-92

ROS Class (in acres and as percentages of total Project Area)

ROS Class	Alternative A1/A2	B	C	D	E	F
PRIM	46,311	34,257	46,311	29,864	42,016	42,098
	16%	12%	16%	10%	15%	15%
SPNM	163,841	159,640	152,624	164,821	151,262	155,270
	56%	55%	53%	57%	52%	54%
SPM	22,605	18,240	21,716	19,365	20,820	20,906
	8%	6%	7%	7%	7%	7%
RN	1,444	1,444	1,444	1,444	1,444	1,444
	1%	1%	1%	1%	1%	1%
RM	54,100	74,720	66,206	72,807	72,758	68,583
	19%	26%	23%	25%	25%	23%
Total	288,301	288,301	288,301	288,301	288,301	288,301
	100%	100%	100%	100%	100%	100%

SOURCE: Nelson and Flynn 1992.

Note: The ROS classes considered include Primitive (PRIM), Semiprimitive Nonmotorized (SPNM), Semiprimitive Motorized (SPM), Road Natural (RN), and Roaded Modified (RM).

Although nine VCUs (227-229, 235, 237-238, 242-244) will not be affected by any alternative, their ROS acres are included in the above totals because they lie within the Project Area boundaries.

Table 4-92 indicates that the greatest changes from the existing situation occur in Alternatives B, D, and E. In these alternatives, the acres of Primitive and Semiprimitive Nonmotorized settings will be reduced, while the Roaded Modified acres all are increased. The increase in the Roaded Modified ROS acres are 20,620 acres for Alternative B, 12,106 acres for Alternative C, 18,707 arcres for Alternative D, 18,658 acres for Alternative E, and 14,483 acres for Alternative F. These changes will have a negative effect on those individuals seeking a nonmotorized recreational experience, and will have a positive impact on those desiring a more modified setting for their activities.

ROS Effects by VCU

Table 4-93 displays for each VCU the same information presented in Tables 4-92 for the entire Project Area. This table provides the reviewer with the opportunity to examine the specific changes projected for each VCU. The direct effects in VCUs 227 to 229, 235, 237, 238, and 242 to 244 will be the same for all alternatives because they will not be entered for harvesting or new road construction.

Table 4-93
ROS Class by Alternative for VCUs (in acres)

		Alternative					
VCU	ROS Class	A1/A2	B	C	D	E	F
227	PRIM	3,464					
	SPNM	172			SAME		
	SPM	193					
	RN	0					
	RM	0					
228	PRIM	6,516					
	SPNM	9,794			SAME		
	SPM	2,319					
	RN	0					
	RM	0					
229	PRIM	9,327					
	SPNM	10,620			SAME		
	SPM	1,560					
	RN	0					
	RM	1,053					
230	PRIM	0	0	0	0	0	0
	SPNM	7,086	4,507	4,588	6,152	4,980	4,558
	SPM	1,320	651	766	637	1,313	613
	RN	0	0	0	0	0	0
	RM	990	4,238	4,042	2,607	3,103	4,225
231	PRIM	0	0	0	0	0	0
	SPNM	16,842	13,701	15,205	15,016	15,007	16,841
	SPM	2,083	1,183	1,158	1,163	2,084	2,084
	RN	0	0	0	0	0	0
	RM	0	4,041	2,562	2,746	1,834	0
232	PRIM	0	0	0	0	0	0
	SPNM	9,349	6,818	9,327	7,872	7,404	9,349
	SPM	1,910	897	1,890	1,333	1,124	1,910
	RN	0	0	0	0	0	0
	RM	0	3,544	42	2,054	2,731	0

Table 4-93 (continued)
ROS Class by Alternative for VCUs (in acres)

VCU	ROS Class	Alternative A1/A2	B	C	D	E	F
233	PRIM	689	0	689	0	689	689
	SPNM	7,931	6,982	6,668	7,381	6,428	6,941
	SPM	111	0	0	0	0	0
	RN	0	0	0	0	0	0
	RM	1,371	3,120	2,745	2,721	2,985	2,472
234	PRIM	0	0	0	0	0	0
	SPNM	3,826	2,514	2,556	3,068	2,876	2,835
	SPM	381	377	377	381	381	381
	RN	0	0	0	0	0	0
	RM	1,600	2,916	2,874	2,358	2,550	2,591
235	PRIM	10,557					
	SPNM	20,328	---------------------- SAME ----------------------				
	SPM	2,688					
	RN	0					
	RM	79					
236	PRIM	0	0	0	0	0	0
	SPNM	4,508	4,508	3,980	3,766	3,413	3,831
	SPM	282	282	282	282	282	282
	RN	71	71	71	71	71	71
	RM	6,168	6,168	6,696	6,910	7,263	6,845
237	PRIM	0					
	SPNM	5,424	---------------------- SAME ----------------------				
	SPM	1,195					
	RN	0					
	RM	27					
238	PRIM	0					
	SPNM	5,282	---------------------- SAME ----------------------				
	SPM	5					
	RN	0					
	RM	4,659					
239	PRIM	0	0	0	0	0	0
	SPNM	9,663	9,663	7,021	8,618	8,118	8,282
	SPM	891	891	1,616	891	891	891
	RN	0	0	0	0	0	0
	RM	6,790	6,790	8,707	7,835	8,335	8,171

Table 4-93 (continued)
ROS Class by Alternative for VCUs (in acres)

		Alternative					
VCU	ROS Class	A1/A2	B	C	D	E	F
240	PRIM	0	0	0	0	0	0
	SPNM	9,197	9,197	9,197	6,367	8,079	9,197
	SPM	187	187	187	120	187	187
	RN	0	0	0	0	0	0
	RM	0	0	0	2,897	1,118	0
241	PRIM	0	0	0	0	0	0
	SPNM	5,727	5,727	4,370	4,744	5,727	4,188
	SPM	0	0	0	0	0	0
	RN	0	0	0	0	0	0
	RM	1,913	1,913	3,270	2,896	1,913	3,452
242	PRIM	0					
	SPNM	4,014	----------------------- SAME -----------------------				
	SPM	2,193					
	RN	0					
	RM	5,248					
243	PRIM	0					
	SPNM	14,523	----------------------- SAME -----------------------				
	RN	601					
	RN	828					
	RM	11,256					
244	PRIM	0					
	SPNM	6,241	----------------------- SAME -----------------------				
	SPM	651					
	RN	545					
	RM	4,846					
245	PRIM	0	0	0	0	0	0
	SPNM	12,564	12,564	12,564	12,554	12,546	12,565
	SPM	3,253	2,350	3,253	3,136	3,136	3,136
	RN	0	0	0	0	0	0
	RM	8,100	9,003	8,100	8,227	8,235	8,216
246	PRIM	15,758	4,393	15,758	0	11,464	11,545
	SPNM	750	7,061	750	12,885	286	285
	SPM	782	17	782	17	17	17
	RN	0	0	0	0	0	0
	RM	0	5,819	0	4,388	5,523	5,443

SOURCE: Nelson and Flynn 1992.

Note: This information derived from GIS data.

Table 4-93 shows that VCUs 230 through 234 and 246 are expected to have the greatest change in the acreage of ROS (from Primitive and Semiprimitive Nonmotorized to Roaded Modified) and that this change would occur in Alternative B. Alternative D (VCUs 233, 236, 240, 241, and 246) and Alternative E (VCUs 232 through 234, 236, and 239) show the next greatest change. Alternative C shows changes in VCUs 230, 234, 239 and 241, and Alternative F shows changes in VCUs 230, 233, 234, and 241.

Recreation Places

Because of noise, visual impacts, and the resulting change in the recreational setting, many existing recreation activities are incompatible with an active logging operation. Recent analysis by the Forest Service has concluded that approximately 50 percent of the current activities occurring in Recreation Places rely upon the natural appearance of the area (Forest Service 1990a). If a Recreation Place is entered for timber harvest, those activities that are incompatible will cease until the area returns to a natural setting. It has been estimated that the natural appearance of such an area would be expected to return after one rotation. As a result, a Recreation Place entered for timber harvest would see a decline in at least some recreation activities for at least 40 years. The degree of impact from roading and harvesting on a Recreation Place determines whether its unique characteristics are lost or remain.

Eight Recreation Places in Alternatives A1 and A2 have been identified in conjunction with existing road systems. They are Head of Seal Bay (VCU 229), Inbetween (VCU 230), South Crab Road System (VCU 233/234), Corner Bay Road System (VCU 236/239), Florence Bay Road North (VCU 241), Sitkoh Bay (VCU 243), False Island Road System (VCU 244/245), and Lindenberg Head (VCU 245). The use of these areas is not dependent on a Primitive or Semiprimitive setting, and they are not adversely affected by the proposed actions in Alternatives B through F.

On the other hand, those Recreation Places that change from a Primitive or Semiprimitive ROS class to a Roaded Modified class are significantly affected. One example is VCU 240, Basket Lake, which includes an existing, unmaintained trail (along the stream) from salt water to the lake, dispersed camp sites, three large streams (flowing into the lake from a relatively flat valley) and a three-tiered waterfall joining the flow of the streams. Alternative D converts a majority of the area surrounding these attributes to Roaded Modified by roading and harvesting in the area.

During timber harvest operations, the roads, sort yards, LTF sites, log raft storage, and camps are often located at or near recreational anchorages. Because of ongoing activity, those recreational anchorages may not be suitable for general public use. Logging operations are historically active for 3 to 7 years. This is expected to be the case for the Southeast Chichagof Project. In addition, recreational users may avoid areas of active logging because the areas do not fulfill the users' expectations of a wildland experience.

Primitive and Semiprimitive Nonmotorized recreation areas might be reduced as a result of timber harvests and road construction.

An indirect effect of the proposed activities in the action alternatives may be increased recreational and subsistence use in the vicinity of the logging camps and logging activities. This increased use would be predominately hunting, fishing, and gathering of forest products. Another indirect effect in the VCUs entered for harvest would be the noise from the logging operations. The noise would occur during the actual logging operations. Depending on which alternative is chosen and how the timber is released to the contractor for harvest, each VCU would have a different length of time it is influenced by noise. The average may be 3 to 7 years.

Specific Effects on Recreation Places

As stated earlier in this section, the inventoried Recreation Places constitute a large portion of the recreational opportunities in the Southeast Chichagof Project Area. Therefore, the degree of change in the condition of the setting and the recreational opportunities available within each Recreation Place is an important measure of the effect of the proposed actions. As a result, it is important to analyze the specific effects on the individual Recreation Places. The following section presents the results of that analysis.

Nine VCUs (227-229, 235, 237, 238, 242-244) do not have any timber harvests or road construction planned in any of the action alternatives. Recreation Places in these VCUs may be affected, however, due to activities in nearby VCUs and overall Road Management Objectives (RMOs) for each alternative. In addition, a Roaded Modified Recreation Place may be enlarged because of the recommended RMOs and the level of maintenance required for recreation use in a particular alternative.

Fifteen Recreation Places are unaltered in all alternatives. These Recreation Places are:

Name	Acres	ROS Class
Goose Flats	765	Primitive
Long Bay Uplands	3,610	Semiprimitive Nonmotorized
Long Bay Beach	2,512	Semiprimitive Motorized
Seal Bay Uplands North	1,047	Semiprimitive Nonmotorized
Head of Seal Bay	1,053	Roaded Modified
Kadashan Bay	2,941	Semiprimitive Motorized
Kadashan Bay Uplands	3,353	Semiprimitive Nonmotorized
Strawberry Island	2	Semiprimitive Motorized
Corner Point	65	Semiprimitive Motorized
Basket Bay North Shore	410	Semiprimitive Motorized
Buckhorn	222	Roaded Modified
Basket Bay South Shore	481	Semiprimitive Motorized
Sitkoh Creek	1,677	Semiprimitive Nonmotorized
Lindenberg Head	1,306	Roaded Modified
Trap Bay	1,236	Semiprimitive Motorized

Table 4-94 lists Recreation Places which are affected in at least one alternative. For each Recreation Place the table shows (by alternative) the changes in acreage and ROS class along with how the Recreation Place influences or is influenced by the land around it. A Recreation Place may absorb all of one recreation place and part of another at the same time. This is represented by the symbol (A/P). Also, in some alternatives, the acreage of a Recreation Place may change to zero while all or part of the area is still a Recreation Place. This is because the land area of the original Recreation Place was absorbed into another.

Road Management

As stated in Chapter 3, the recreation opportunities provided in each alternative are influenced by the existence and use of roads. In addition, Road Management Objectives (RMOs) provide the direction for the design, maintenance, and access strategies of each road. For a detailed explanation and listing of RMOs see the Glossary and Appendix I. Appendix I also displays the RMOs for each road by alternative in Tables I-6 through I-11.

The primary feature of RMOs that affect the recreation resource and specifically the recreation opportunities provided in a roaded area is the access strategy. The post-harvest traffic strategies have a substantial effect on the level and type of recreational use that occurs in a roaded area. Roads with access strategies that encourage or accept motor vehicle use (either full-size vehicles or ATVs) will provide a much different recreational opportunity than roads with access strategies that eliminate or prohibit motor vehicle use.

The ROS class that will result from a particular alternative reflects the RMOs specified for the roads. This is reflected in the ROS acres displayed in the beginning of this section.

Table 4-94
Effects of Alternatives on Individual Recreation Places

Recreation Place	Al/A2	B	C	D	E	F
	Alternative					
Seal Bay						
Acres	2,387	2,207	2,322	2,193	2,636	2,039
ROS Class	SPM	SPM	SPM	SPM	SPM	SPM
Absorbed Into Another Rec Place	-	Part	Part	Part	Part	Part
Absorbs Another Rec Place	-	Part	Part	No	Part	No
Adds Other Acres	-	No	No	No	Yes	No
Still a Rec Place	-	All	All	All	All	All
Seal Bay Uplands South						
Acres	1,944	1,259	1,244	1,869	1,283	1,283
ROS Class	SPNM	SPNM	SPNM	SPNM	SPNM	SPNM
Absorbed Into Another Rec Place	-	Part	Part	Part	Part	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	Part	All	Part	Part
Inbetween						
Acres	329	0	0	0	1,333	2,234
ROS Class	RM	-	-	-	RM	RM
Absorbed Into Another Rec Place	-	All	All	All	No	No
Absorbs Another Rec Place	-	No	No	No	A/P	A/P
Abosrbs Another Rec Place	-	No	No	No	Yes	Yes
Still a Rec Place	-	All	All	All	All	All
Inbetween Southeast						
Acres	162	0	0	0	0	0
ROS Class	SPM	-	-	-	-	-
Absorbed Into Another Rec Place	-	All	All	All	All	All
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	All
Saltery Bay						
Acres	1,848	0	3,946	0	1,848	1,978
ROS Class	SPM	-	RM	-	SPM	SPM
Absorbed Into Another Rec Place	-	All	Part	All	No	No
Absorbs Another Rec Place	-	No	A/P	No	No	No
Adds Other Acres	-	No	Yes	No	No	Yes
Still a Rec Place	-	All	All	All	All	All

Table 4-94 (continued)
Effects of Alternatives on Individual Recreation Places

Recreation Place	Alternative AI/A2	B	C	D	E	F
Saltery Bay Uplands						
Acres	3,170	944	0	0	3,068	3,170
ROS Class	SPNM	SPM	-	-	SPNM	SPNM
Absorbed Into Another Rec Place	-	Part	Part	Part	No	No
Absorbs Another Rec Place	-	Part	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	Part	Part	Part	All
Crab Bay						
Acres	2,257	1,133	2,126	1,569	1,360	2,146
ROS Class	SPM	SPM	SPM	SPM	SPM	SPM
Absorbed Into Another Rec Place	-	Part	Part	Part	Part	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	Part
Crab Bay Uplands						
Acres	4,994	3,947	4,972	0	2,141	4,994
ROS Class	SPNM	SPNM	SPNM	-	RM	SPNM
Absorbed Into Another Rec Place	-	Part	Part	Part	No	No
Absorbs Another Rec Place	-	Part	No	No	Part	No
Adds Other Acres	-	Yes	No	No	Yes	No
Still a Rec Place	-	Part	All	Part	Part	All
South Crab Road System						
Acres	1,367	0	3,670	0	3,078	1,454
ROS Class	RM	-	RM	-	RM	RM
Absorbed Into Another Rec Place	-	Part	No	All	No	No
Absorbs Another Rec Place	-	No	Part	No	Part	No
Adds Other Acres	-	No	Yes	No	Yes	Yes
Still a Rec Place	-	Part	Part	All	All	All
Lower Fog Creek						
Acres	381	377	377	381	381	381
ROS Class	SPM	SPM	SPM	SPM	SPM	SPM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	Part	All	All	All

Table 4-94 (continued)
Effects of Alternatives on Individual Recreation Places

Recreation Place	Alternative A1/A2	B	C	D	E	F
Upper Fog Creek						
Acres	568	231	221	514	568	568
ROS Class	SPNM	SPNM	SPNM	SPNM	SPNM	SPNM
Absorbed Into Another Rec Place	-	No	No	Part	Part	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	Part	All	All	All
Corner Bay						
Acres	12,044	1,779	1,932	38,156	2,278	1,943
ROS Class	RM	RM	RM	RM	RM	RM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	No	No	A/P	No	No
Adds Other Acres	-	No	Yes	Yes	Yes	Yes
Still a Rec Place	-	Part	Part	All	Part	Part
Kook Lake						
Acres	1,029	1,029	725	1,029	1,010	1,029
ROS Class	SPNM	SPNM	RM	SPNM	SPNM	SPNM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	Part	All	Part	All
Basket Lake						
Acres	3,149	3,149	3,149	0	2,526	3,149
ROS Class	SPNM	SPNM	SPNM	-	SPNM	SPNM
Absorbed Into Another Rec Place	-	No	No	Part	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	Part	Part	All
Little Basket Bay						
Acres	187	187	187	187	187	187
ROS Class	SPM	SPM	SPM	RM	SPM	SPM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	All

Table 4-94 (continued)
Effects of Alternatives on Individual Recreation Places

Recreation Place	Alternative A1/A2	B	C	D	E	F
Little Basket Lake						
Acres	1,006	1,006	1,161	0	1,006	1,299
ROS Class	SPNM	SPNM	RM	-	SPNM	RM
Absorbed Into Another Rec Place	-	No	No	Part	No	Part
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	Yes	No	No	Yes
Still a Rec Place	-	All	Part	Part	All	All
Florence Bay Road North						
Acres	1,913	1,913	0	0	1,913	2,153
ROS Class	RM	RM	-	-	RM	RM
Absorbed Into Another Rec Place	-	No	All	All	No	No
Absorbs Another Rec Place	-	No	No	No	No	Part
Adds Other Acres	-	No	No	No	No	Yes
Still a Rec Place	-	All	All	All	All	All
North of White Rock						
Acres	25	25	0	0	25	25
ROS Class	RM	RM	-	-	RM	RM
Absorbed Into Another Rec Place	-	No	All	All	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	All
Sitkoh Bay						
Acres	4,754	4,754	0	0	4,754	4,754
ROS Class	RM	RM	-	-	RM	RM
Absorbed Into Another Rec Place	-	No	All	All	No	No
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	All
False Island Road System						
Acres	6,651	5,625	16,140	0	5,625	5,625
ROS Class	RM	RM	RM	-	RM	RM
Absorbed Into Another Rec Place	-	No	No	Part	No	No
Absorbs Another Rec Place	-	No	All	No	No	No
Adds Other Acres	-	No	Yes	No	No	No
Still a Rec Place	-	Part	Part	Part	Part	Part

Table 4-94 (continued)
Effects of Alternatives on Individual Recreation Places

Recreation Place	Alternative AI/A2	B	C	D	E	F
Upper Broad Creek						
Acres	625	0	625	0	0	0
ROS Class	PRIM	-	PRIM	-	-	-
Absorbed Into Another Rec Place	-	Part	No	Part	All	Part
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	All	Part	All	Part
Lower Broad Creek						
Acres	283	16,892	283	14,622	1,492	1,876
ROS Class	SPM	RM	SPM	RM	RM	RM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	A/P	No	A/P	A/P	A/P
Adds Other Acres	-	Yes	No	Yes	Yes	Yes
Still a Rec Place	-	All	All	All	All	All
Upper Broad Finger Creek						
Acres	541	0	541	0	0	0
ROS Class	PRIM	-	PRIM	-	-	-
Absorbed Into Another Rec Place	-	Part	No	Part	Part	All
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	Part	All	Part	Part	All
Lower Broad Finger Creek						
Acres	188	0	188	0	0	0
ROS Class	SPM	-	SPM	-	-	-
Absorbed Into Another Rec Place	-	All	No	All	All	All
Absorbs Another Rec Place	-	No	No	No	No	No
Adds Other Acres	-	No	No	No	No	No
Still a Rec Place	-	All	All	All	All	All
Hot Springs						
Acres	5	604	5	1,699	1,536	5
ROS Class	PRIM	RM	PRIM	RM	RM	RM
Absorbed Into Another Rec Place	-	No	No	No	No	No
Absorbs Another Rec Place	-	Part	No	Part	Part	No
Adds Other Acres	-	Yes	No	Yes	Yes	No
Still a Rec Place	-	All	All	All	All	All

Table 4-94 (continued)
Effects of Alternatives on Individual Recreation Places

	Alternative					
Recreation Place	**AI/A2**	**B**	**C**	**D**	**E**	**F**
Saltery Bay South Shore*						
Acres	-	-	923	923	-	-
ROS Class	-	-	SPM	SPM	-	-
Absorbed Into Another Rec Place	-	-	-	-	-	-
Absorbs Another Rec Place	-	-	-	-	-	-
Adds Other Acres	-	-	-	-	-	-
Still a Rec Place	-	-	-	-	-	-

SOURCE: Nelson and Flynn 1992.

* This is a new Recreation Place that would be created in Alternatives C and D.

Recreation Use

Chapter 3 discussed the existing recreation demand and expected trends. The primary trend is the expectation that the demand for all ROS classes will grow, and the largest growth will be in the Semiprimitive Motorized class. It also appears that demand can be met into the future for all of the ROS classes except the Semiprimitive Motorized. It appears demand will exceed supply forestwide as well as in the Project Area for this recreational opportunity by the end of the decade. All action alternatives will contribute to this decline in the Semiprimitive Motorized ROS class along the marine interface.

The results of these impacts to recreationists and providers of commercial services can be described in general terms. One outcome is the displacement of activities to other areas that provide the natural setting and amenities that users or clients are seeking. This may conflict with existing operations already established, or it may increase the pressure on Wilderness, Monument, and legislated LUD II areas. Another outcome is the acceptance of the changes that occur in the area or development of substitute activities that do not require a totally natural or primitive setting. A final outcome might be the elimination of the amount and level of services currently and potentially provided in the area.

Recreation Special Use Permits

There are approximately 13 existing Recreation Special Use Permits in the Project Area. Most of these permittees are dependent on the relatively natural conditions of the Project Area. However, there is a substantial history of logging in the Project Area and considerable logging activities are going on at this time. It seems to indicate that these two activities can coexist under some situations.

Overall, the roads and clearcuts may affect the bear use patterns of the area. With more people in the area, the chances for defense-of-life and property conflicts may arise. These two problems could result in fewer bears being located by outfitter/guides, which in turn, may cause dissatisfied clients. The guides who use the area for sightseeing might also be impacted, depending on which alternative is chosen and which area the guides use.

Cumulative Effects

ROS

The changes to the landscape as a result of timber harvests and road construction would change the ROS class for the affected areas from a Primitive or Semiprimitive Nonmotorized ROS opportunity to a Roaded Modified ROS. As harvesting continues over the life of the APC contract, the Primitive and Semiprimitive Nonmotorized opportunities may be significantly reduced or eliminated within the Project Area. In addition, if the decision is made to manage more roads for motorized recreational use, the recreation opportunities would shift to those offered in a motorized setting.

Other planning efforts scheduled in the next 10 years include areas to the north, south, and west. Primitive and Semiprimitive opportunities may be reduced or eliminated from these areas as well. Analysis in the Supplement to the TLMP DEIS indicates a sufficient supply, except for the Semiprimitive Motorized class, of all of the ROS classes forestwide to meet projected demand. It appears demand will exceed supply within a decade for this setting, which characterizes the marine nature of recreation on the Tongass.

Recreation Places

Timber harvest and road construction along or near the beaches may have a significant effect on the recreational users in this area. Access for most people is by boat, the most economical and flexible mode of traveling for this area. If the anchorages and beaches are protected, people would most likely continue to use these areas. However, because of the disturbance in the surrounding areas, there would be a change in the recreational experiences provided. Future entries into this area and those planned in adjacent areas would continually shift the settings of the Recreation Places from natural to more developed. Over time, the activities and experiences would change as well.

One of the consequences over time would be increased competition for those places with natural settings, especially Semiprimitive Motorized along the marine interface. The activities of subsistence users, resident recreational users, visitors, and outfitters and guides may not always be compatible. Conflicts among users may occur, and social encounters are likely to increase. This will increase the need for active management of the various users in some areas, furthering the shift to developed and regimented settings.

Recreation Use

With the harvesting of the Project Area, there may be a general displacement or elimination of recreational users who are seeking a wildlands experience. This may also occur with the outfitters and guides who provide a wildlands experience for clients. Outfitters have several options in changing the activities and services they provide and in capturing new market segments. Recreational users have similar options. On the other hand, the continual development would open up the Project Area to recreation activities that are not dependent on a natural setting. This would particularly be true as the small isolated road networks are gradually connected over time.

Visual Quality

Direct and Indirect Effects

A key attraction of Southeast Alaska for the recreational user, occasional visitor, and those who live there is its beauty and splendor. Because of the impact of tourism, the visual resources are important not only for the general enjoyment of the area, but also for the economy .

Alternatives A1 through F would result in visual impacts of varying degrees in the Southeast Chichagof Project Area. These impacts would come primarily from clearcut harvest methods, road construction, and the construction of LTFs. These activities often create unnatural lines and textures in the landscape which contrast with the rough, even-texture characteristic of Southeast Alaska's old-growth forest. These visual impacts, in many cases, may be evident to the average National Forest visitor.

Field observations and topographic map analyses were used to determine the visual impacts of the various alternatives. Computer-generated perspective views were not used in the analysis because of staffing and computer-time limitations. This evaluation assumes that mitigation measures developed during the project analysis for the visual resource will be considered during harvest unit and road layout.

Harvest and related activities would affect the visual quality of the Project Area.

Table 4-95 displays the resulting Visual Quality Levels (VQLs) for each alternative's activities. VQLs are the level of visual quality that would result from the implementation of each alternative expressed in the same terms as the Visual Quality Objectives (VQOs), e.g., Retention, Partial Retention, Modification, and Maximum Modification.

Table 4-95
Visual Quality Levels Resulting from the Implementation of the Southeast Chichagof Project Alternatives (in acres)

Visual Quality Levels	Alternatives A1/A2	B	C	D	E	F
Retention	5,954	5,954	5,954	5,954	5,954	5,954
Partial Ret.	86,945	86,261	85,954	85,903	86,121	86,178
Modification	71,099	71,569	71,892	72,022	71,923	71,866
Max. Mod.	32,870	33,084	33,068	32,989	32,870	32,870
Total	196,868	196,868	196,868	196,868	196,868	196,868

SOURCE: Monaco and Loeffler 1991.

The reduction of Partial Retention VQL acreages with the corresponding increase in Modification and Maximum Modification represents a slightly to moderately altered range of impacts. Acreage in Partial Retention decreases one percent or less for all action alternatives with Alternatives D and E having the most impact. Corresponding acreage increase in Modification and Maximum Modification VQLs are also one percent or less with Alternative D having the greatest increase in these VQL acreages.

Timber Harvest and Road Construction

This discussion displays the environmental consequences of timber harvesting and road construction on the visual resource by alternative and VCU. See the following section for the discussion of the effects of LTFs and logging camps.

Alternative A1
With this No-Action Alternative, the inventoried VQOs and the Existing Visual Condition would remain unchanged. The existing visual condition ranges from natural appearing in VCU 246 to heavily altered in VCUs 236, 239, and 241.

Alternative A2
With this No-Action Alternative, which depicts discontinuing SEIS harvest in the Project Area, the inventoried VQOs and the Existing Visual Condition would change very little. The existing visual condition ranges from natural appearing in VCU 246 to heavily altered in VCUs 236, 239, and 241.

Alternative B
This alternative concentrates timber harvesting and road building activities in the northwest portion of the Project Area where previous management activities have been limited. Of the six VCUs entered, there would be a total of 17 harvest units which do not fully meet the Visual

Quality Objectives. The existing visual condition of the VCUs entered by this alternative ranges from natural appearing to slightly altered. The future visual condition resulting from implementation of this alternative would range, depending on the specific VCU, from moderately altered to heavily altered.

VCU 230: Units 1590 and 1593 do not meet the VQO of Partial Retention and would only meet the Maximum Modification VQL as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. Unit 1680 also does not meet the Partial Retention VQO, but will meet the Modification VQL. The size of the units contrasts with naturally occurring openings. Due to topographic screening, all other units should meet the VQOs. Proposed roads may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 231: Because of its large size, unit 1691 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. The unit will meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 232: Because of their large size, units 2500 and 2501 do not meet the VQO of Modification as seen from small-boat routes in the Tenakee Inlet, but do meet the VQL of Maximum Modification. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 233: Because of their large size, units 2020, 2021, 2030, 2031, and 2040 do not meet the Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. They will, however, meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV) to heavily altered (V).

VCU 234: Unit 1870 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes but does meet the Modification VQL. Its large size and rectilinear form contrasts with naturally occurring openings. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be heavily altered (V).

VCUs 236, 239, 240, and 241: No harvest units or roads are proposed in these VCUs.

VCU 246: Units 3670, 3720, 4030, 4031, 4110 do not meet Partial Retention VQOs as seen from the ferry route in Peril Strait and as seen from the small-boat routes, but do meet the Modification VQL. The large sizes and rectilinear forms of the units contrast with natural occurring openings. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is natural appearing (II); the Future Visual Condition would be moderately altered (IV).

Alternative C

Under Alternative C, timber harvest and road building would be concentrated in previously impacted areas. Of the 7 VCUs entered, 6 would have a total of 19 harvest units which do not fully meet the VQOs. The existing visual condition of the VCUs entered by this alternative ranges from slightly to heavily altered in appearance. The future visual condition resulting from implementation of this alternative would range, depending on the specific VCU, from moderately altered to extremely altered. There would be no impact in VCUs 232, 240, and 246.

VCU 230: Units 1590 and 1593 do not meet the VQO of Partial Retention and would only meet the Maximum Modification VQL as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. Unit 1680 does not meet the Partial Retention VQO, but will meet the Modification VQL. The size of the units contrasts with naturally occurring openings. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV) to heavily altered (V).

VCU 231: Because of their large sizes, units 1691, 2090, 2110, and 2140 do not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from small boat routes. They will, however, meet the Modification VQL. All other units should meet the inventoried VQOs. Proposed roads should not affect VQLs. The existing visual condition for this VCU is slightly altered (III); the future visual condition would be moderately altered (IV).

VCU 233: Units 2020 and 2021 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. This is due to the large size of the two units. They will, however, meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 232: No harvest units or roads are proposed in this VCU.

VCU 234: Unit 1870 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes, but it will meet the Modification VQL. Due to its large size and rectilinear form, it contrasts with naturally occurring openings. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is moderately altered (IV); the Future Visual Condition would be heavily altered (V).

VCU 236: Units 1050, 1051, 1090, and 1091 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from small-boat routes. They will, however, meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition is heavily altered (V); the Future Visual Condition would be heavily altered (V) to extremely altered (VI).

VCU 239: Because of their large sizes and Unit 1260's rectilinear form, Units 1260, 1320, 1340, and 1390 do not meet the Partial Retention VQO as seen from Kook Lake and the Basket Bay Trail. They will, however, meet the Modification VQL. Due to its large size, Unit 1370 does not meet the Partial Retention VQO as seen from Kook Lake and the Basket Bay Trail. It will meet the Maximum Modification VQO. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is moderately altered (IV) to heavily altered (V); the Future Visual Condition would be heavily altered (V) to extremely altered (VI).

VCU 240: No harvest units or roads are proposed in this VCU.

VCU 241: Because of topographic screening, all units should meet the VQOs. Proposed roads are unseen or located in areas with low visibility and should not negatively affect the VQLs. The general Existing Visual Condition for this VCU is heavily altered (V); the Future Visual Condition would remain the same.

VCU 246: No harvesting or roads are proposed in this VCU.

Alternative D

Under Alternative D, timber harvest and road building would be more widely distributed than the other alternatives. Of the 10 VCUs entered, 6 would have a total of 18 harvest units which do not fully meet the Visual Quality Objectives. The existing visual condition of the VCUs entered by this alternative ranges from natural appearing to heavily altered. The future visual condition resulting from implementation of this alternative would range, depending on the specific VCU, from slightly altered to extremely altered.

VCU 230: Units 1590 and 1593 do not meet the VQO of Partial Retention and would only meet the Maximum Modification VQL as seen from the ferry route to Tenakee Springs and from the small-boat routes. Unit 1680 also does not meet the Partial Retention VQO, but will meet the Modification VQL. All other units should meet the VQOs. Proposed roads with mid-slope locations may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 231: Because of their large sizes, units 1691, 2090, 2110, and 2140 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes, but will meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 232 and 233: Because of topographic screening all units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be moderately altered (IV).

VCU 234: Unit 1870 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes, but does meet the Modification VQL. Because of topographic screening all other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCU 236: Because of their large sizes, units 1050, 1051, 1090, 1091, and 1110 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. They do, however, meet the Modification VQL. Because of topographic screening, all other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is heavily altered (V); the Future Visual Condition would be heavily altered (V) to extremely altered (VI).

VCU 239: Because of their large sizes, units 1260 and 1320 do not meet the Partial Retention VQO as seen from Basket Lake and the Basket Bay Trail. They do meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is moderately altered (IV) to heavily altered (V); the Future Visual Condition would be moderately altered (IV) to heavily altered (IV).

VCU 240 and 241: Due to topographic screening, all units should meet the VQOs. Proposed roads are unseen and located in areas with low visibility and should not negatively impact the VQLs. The general Existing Visual Condition for VCU 240 is natural appearing (II); the Future Visual Condition would be slightly altered (III). The general Existing Visual Condition for VCU 241 is moderately altered (IV); the Future Visual Condition would be heavily altered (V).

VCU 246: Because of their large size, units 3610, 4030, and 4031 do not meet Partial Retention VQOs as seen from the ferry route in Peril Strait and as seen from the small-boat routes. They will meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is natural appearing (II); the Future Visual Condition alternative would be slightly altered (III).

Alternative E

This alternative proposes most of the timber harvest and road building away from saltwater and lakes. This would allow more visibility to the visitors of the Project Area. Of the nine VCUs entered, five would have a total of 14 harvest units which do not fully meet the Visual Quality Objectives. The existing visual condition of the VCUs entered by this alternative ranges from natural appearing to heavily altered. The future visual condition resulting from implementation of this alternative would range, depending on the specific VCU, from moderately altered to extremely altered.

VCU 230: Unit 1590 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes, but does meet the Modification VQL. Due to topographic screening, all other units should meet the VQOs. Proposed roads may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCUs 231, 232, and 234: Because of topographic screening, all proposed units and roads should meet the VQOs. The general Existing Visual Condition for these VCUs is slightly altered (III); the Future Visual Condition resulting from this alternative would remain the same for VCUs 231 and 234 and slightly altered (III) to moderately altered (IV) for VCU 232.

VCU 233: Because of their large size, units 2030, 2031, and 2040 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. They do, however, meet the Modification VQL. All other units should meet the VQOs. Proposed roads may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCU 236: Because of their large sizes, units 1050, 1051, 1090, 1091, and 1110 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes. They do, however, meet the Modification VQL. Due to topographic screening, all other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is heavily altered (V); the Future Visual Condition would be heavily altered (V) to extremely altered (VI).

VCU 239: Because of their large size, Units 1260 and 1320 do not meet the Partial Retention VQO as seen from Kook Lake and the Basket Bay Trail, but does meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is moderately altered (IV) to heavily altered (V); the Future Visual Condition would be heavily altered (V).

VCU 240: Because of topographic screening all harvest units and roads should meet the VQOs. The general Existing Visual Condition for this VCU is natural appearing (II); the Future Visual Condition would remain the same.

VCU 241: No harvest units or roads are proposed in this VCU.

VCU 246: Units 3670, 3720, and 4110 do not meet Partial Retention VQOs as seen from the ferry route in Peril Strait and as seen from the small-boat routes. They do, however, meet the Modification VQL. Their large sizes contrast with naturally occurring openings. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is natural appearing (II); the Future Visual Condition would be slightly altered (III).

Alternative F

Alternative F proposes most of the timber harvest units and road construction away from saltwater and lakes. This would allow more visibility to visitors of the Project Area. Proposed activities are concentrated in previously harvested VCUs. Of the seven VCUs entered, five would have a total of 13 harvest units which do not fully meet the VQOs. The existing visual condition of the VCUs entered by this alternative ranges from natural appearing to heavily altered. The future visual condition resulting from implementation of this alternative would range, depending on the specific VCU, from slightly altered to extremely altered.

VCU 230: Unit 1590 does not meet the Partial Retention VQO as seen from the ferry route to Tenakee Springs and as seen from the small-boat routes, but does meet the Modification VQL. Because of its large size and rectilinear form, the unit contrasts with naturally occurring openings. Due to topographic screening all other units should meet the VQOs. Proposed roads may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCU 231 and 232: No harvest units or roads are proposed in these VCUs.

VCU 233: Unit 2040 does not meet the Partial Retention VQO because of its large size and rectilinear form, but it does meet the Modification VQL. All other units should meet the VQOs. Proposed roads may create some contrasting line effects, but should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCU 234: Because of topographic screening, all units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is slightly altered (III); the Future Visual Condition would be slightly altered (III) to moderately altered (IV).

VCU 236: Because of their large sizes units 1050, 1051, 1090, 1091, and 1110 do not meet Partial Retention VQOs as seen from the ferry route to Tenakee Springs and as seen from small-boat routes. They do, however, meet the Modification VQL. Due to topographic screening all other units should meet the VQOs. Proposed roads should not negatively affect VQLs. The general Existing Visual Condition for this VCU is heavily altered (V); the Future Visual Condition would be heavily altered (V) to extremely altered (VI).

VCU 239: Units 1260 and 1320 do not meet the Partial Retention VQO as seen from Kook Lake and the Basket Bay Trail due to their large sizes and Unit 1260's rectilinear form, but do meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is moderately altered (IV) to heavily altered (V); the Future Visual Condition would be heavily altered (V).

VCU 240: No harvest units or roads are proposed in this VCU.

VCU 241: Because of topographic screening all harvest units and roads should meet the VQOs. The general Existing Visual Condition for this VCU is moderately altered (IV); the Future Visual Condition resulting from this alternative would be heavily altered (V).

VCU 246: Units 3720, 4030, 4031, and 4110 do not meet Partial Retention VQOs as seen from the ferry route in Peril Strait and small-boat routes, but do meet the Modification VQL. All other units should meet the VQOs. Proposed roads should not affect VQLs. The general Existing Visual Condition for this VCU is natural appearing (II); the Future Visual Condition would be slightly altered (III).

Log Transfer Facilities (LTFs) and Logging Camps

The large size, linear bold shape, and saltwater location of LTFs generally present a very strong visual impact when viewed within a foreground distance. Their relative low profile, however, helps to blend them into background views. Clearings for sort yards and logging camps also add to the visual impacts associated with LTFs; however, their location, which is usually on fairly level or gently sloping sites, helps to absorb much of their visual contrasts when viewed from salt water. Floating logging camps are being considered for this project. Visual impacts from these are considered to be much less than more permanent upland camps.

Slide-type LTFs usually present less of a visual impact than larger bulkhead-type facilities. The bold form of the bulkhead associated with barge LTFs prevents it from blending into the surrounding landscape. Often, the type of material and color of the bulkhead creates strong contrasts that can be seen even in the background distance zone. Careful selection of materials and colors can effectively mitigate such contrasts.

In the longer term, second–growth trees would become established.

The following LTFs are proposed under one or more of the alternatives:

Inbetween LTF
This LTF is located in the Tenakee Inlet (VCU 230) where it would be seen from the small-boat travel route and there is a VQO of Modification. It would include a temporary low–angle slide and floating camp and should meet the VQO.

Crab Bay LTF
This LTF is located in Crab Bay on the south shore (VCU 233) where it would be seen as middleground from Tenakee Springs, the ferry route, and the small-boat route; the VQO is Partial Retention. It would include a permanent low–angle slide and either a logging camp at the LTF site or boat access from a Corner Bay camp. If no logging camp is located at Crab Bay, it may meet the VQO; otherwise, it would instead meet the Modification VQL.

Corner Bay LTF
This LTF is located in Corner Bay (VCU 236) where it is seen as middleground from Tenakee Springs, the ferry route, and the small-boat route. It is located in an area with a VQO of Partial Retention. It includes a permanent low–angle slide and a logging camp. It does not meet

Partial Retention, but will meet the Modification VQL.

False Island LTF

This LTF is located on the shore near False Island (VCU 245) where it is seen as middleground from the ferry route and small-boat routes in Peril Strait. It is located in an area with a VQO of Partial Retention. It includes a permanent bulkhead, logging camp, and sort yard. The False Island LTF meets the VQL of Modification.

Oly Creek LTF

This LTF is located west of Oly Creek (VCU 245) where it is seen as middleground from the ferry route and small-boat routes in Peril Strait. The area has a VQO of Partial Retention. It involves a permanent barge facility and onshore logging camp or it could be accessed by boat from False Island. It would instead meet the VQL of Modification.

Cumulative Effects and Long-term Productivity

The potential for visual impact is greatest immediately following harvest. In the foreground (up to 1/2 mile), stumps and debris are dominant. Activities associated with road construction, such as cut and fill slopes, rock pits, and turnouts, would be readily visible to the observer. As seen in the middle-ground (1/2 mile to 3 miles), vivid distinction in texture of the mature stand and the harvest unit would be apparent. Exposed boles and limbs of the adjacent stand would dominate the visual setting.

By the fifth year of regeneration, the new forest would be filling out with low-lying vegetation (berry bushes, ferns, etc.). In some cases, young alder would be present where disturbance occurred. In the foreground, the visual effects of the clearcut would be evident, but the shrubby vegetation and young trees would begin to cover over the stumps and exposed ground. In the middle-ground, the harvest unit would remain evident, with sharp contrast in color and texture.

From year 5 to 20, the young trees would become established, reaching a height of approximately 15 feet. After 20 years, the forest visitor would see a healthy, thinned stand of spruce and hemlock, with some yellow cedar in the foreground. Views created with the original clearcut would become limited. The precommercial thinning process would create a well-defined stand. In the middle-ground, the contrast between the new forest and the mature forest would be very obvious.

At the end of 50 years, the new forest would reach a height of approximately 50 feet. As seen in the middle-ground, this stand would be approximately half the height of the existing mature stands, providing a smooth visual transition at the harvest unit boundary. Should new harvest occur adjacent to the 50-year stand, the effect would be an even less obvious transition. In the foreground, the growth of the stand would limit views beyond the original unit. At the end of 50 years, the canopy would be closing and the new forest would appear very dense.

Toward the end of 80 years, the stand would reach 75 percent of its mature height. From the middle-ground, there would be less distinction between this stand and adjacent mature forests. The canopy would appear full with crowns touching, allowing little sunlight to reach the forest floor and little understory vegetation. As seen in the foreground, tree boles with diameters of 23 inches would appear visibly dominant from the road; the canopy would be visible at approximately 30 feet from the forest floor. Roadside vegetation would include ferns and berry bushes.

At 100 years, little visual difference would be noticed between the 100-year forest and an adjacent overmature forest. Timber would reach approximately 100 feet in height and appear healthy, lush, and with full canopy. In the foreground, the new forest would be extremely dense, with little light reaching the forest floor. Selective harvest or small group selection may

be necessary adjacent to recreational roads to allow additional sunlight, for safety purposes, or to increase vista opportunities. In the middle-ground, the color and texture of the new forest would allow distinction between it and adjacent overmature forests, which display a scattering of dead tops with generally more irregular tree-growth pattern.

Assuming a continuation of the present harvest level and implementation of resource constraints in accordance with the Forest Plan through the year 2090, timber harvest would continue to occur in the Southeast Chichagof Project Area. Of the total 154,523 acres of CFL in the Project Area, 13 percent of this acreage or 20,088 acres are in extended rotation blocks. During this time, the forest would be in a continual state of obvious visual changes, the appearance of which would be as described above.

Proposed harvest units may occur adjacent to or near existing units harvested in previous entries. Even though harvest units may individually meet the VQO assigned to an area, as a group they may cumulatively disturb or change too much of the natural landscape during one period of time. Approximately 20 years is required for trees to grow 30 feet tall in a regenerated clearcut, the minimum height required to return the area to a continuous textured landscape. The amount of disturbance allowed in any given area (generally shown as a percentage) over an approximate 20-year period in order to meet the intent of the VQO is the Maximum Disturbance Threshold (MDT). Following are listed MDTs by VQO:

VQO	Maximum Disturbance Threshold (MDT)
Retention (R)	No more than 8 percent of the area may be in a disturbed condition at any one time (MDT).
Partial Retention (PR)	No more than 16 percent of the area may be in a disturbed condition at any one time (MDT).
Modification (M)	No more than 25 percent of the area may be in a disturbed condition at any one time (MDT).
Maximum Modification (MM)	No more than 35 percent of the area may be in a disturbed condition at any one time (MDT).

The resulting or expected cumulative visual effects for the project are displayed in Table 4-96. Proposed harvest unit acres are combined with existing harvest unit acres (those with conifer regeneration less than 30 feet in height) and are shown as a percentage of the total acres of that VQO within the VCU. The resulting percentage may then be compared to the MDT to determine potential visual impacts.

Table 4-96

Comparison of the Maximum Disturbance Threshold (MDT) with Expected Visual Cumulative Effects (CE) (in percent)[1]

VCU	VQO	MDT	A1/A2	B	C	D	E	F
230	PR	16	3	15	15	12	6	13
	M	25	3	10	9	5	7	10
231	R	8	0	9*	9*	7	2	0
	PR	16	3	8	9	9	5	3
	M	25	3	4	3	3	3	3
	MM	35	<1	3	1	1	3	<1
232	R	8	0	0	0	0	0	0
	PR	16	3	7	3	4	4	3
	M	25	5	14	5	8	7	5
	MM	35	1	8	1	6	8	1
233	R	8	22*	23*	22*	23*	22*	23*
	PR	16	6	14	8	6	12	9
	M	25	3	11	12	9	7	9
	MM	35	<1	3	4	3	3	3
234	PR	16	7	17*	17*	13	12	15
	M	25	21	32*	32*	27*	27*	32*
	MM	35	0	<1	<1	<1	<1	<1
236	R	8	13*	13*	13*	13*	13*	13*
	PR	16	15	15	23*	23*	25*	23*
	M	25	19	19	24	24	24	24
	MM	35	0	0	13	13	13	13
239	R	8	14*	14*	24*	15*	19*	18*
	PR	16	12	12	17*	17*	17*	17*
	M	25	10	10	13	13	13	13
	MM	35	0	0	5	5	5	5
240	PR	16	<1	<1	3	5	2	<1
	M	25	0	0	5	3	3	0
	MM	35	0	0	<1	14	2	0
241	PR	16	15	15	17*	17*	15	17*
	M	25	0	0	6	4	0	6
	MM	35	0	0	0	0	0	0
246	R	8	0	<1	0	0	0	0
	PR	16	<1	8	<1	5	4	5
	M	25	0	6	0	3	5	6
	MM	35	0	5	0	3	4	4

SOURCE: Monaco and Loeffler 1991.

1 Asterisk indicates where visual cumulative effects exceed the MDT for the VQO andVCU.

Lands

Direct, Indirect, and Cumulative Effects

Alternative B

Harvest units and transportation facilities planned under Alternative B will not directly conflict with any known private lands or interests in private lands. There is a harvest unit planned in VCU 246 within one-quarter mile of IC-1257, which is an ANCSA Section 14(h)(1) historical site (Hoonah Sound Village) that was conveyed to Sealaska Corporation.

Alternative B will utilize the LTF at False Island.

Alternative C

Alternative C will result in the construction of logging roads within lands selected (but not conveyed) by both Sealaska Corporation and Kootznoowoo, Inc., within VCU 241. These lands are within a long-term timber sale contingency area. Section 908 of ANILCA provides that these lands may not be entered by the timber contractor, nor the timber cut, except by agreement with the Native corporations, so long as the corporations have remaining entitlement. Both Kootznoowoo, Inc. and Sealaska Corporation still have remaining entitlement. Alternative D will result in timber harvest adjacent to lands selected by Sealaska Corporation and Kootznoowoo, Inc. but not conveyed, within VCU 241. This selection boundary is not surveyed, and caution is required to avoid inadvertent timber harvesting within this selection.

Alternative C will utilize LTFs at Corner Bay, Crab Bay, False Island, and Inbetween Creek. Facilities at Corner Bay, Crab Bay, and False Island are currently authorized and constructed. Inbetween Creek would require a COE permit and EPA NPDES permit to reactivate the site.

Alternative D

There is a harvest unit planned in VCU 246 within one-quarter mile of IC-1257, which is an ANCSA Section 14(h)(1) historical site (Hoonah Sound Village) that was conveyed to Sealaska Corporation.

Alternative D will also result in the construction of logging roads within lands selected (but not conveyed) by both Sealaska Corporation and Kootznoowoo, Inc., within VCUs 240 and 241. These lands are within a long-term timber sale contingency area. Section 908 of ANILCA provides that these lands may not be entered by the timber contractor nor may the timber be cut, except by agreement with the Native corporations, so long as the corporations have remaining entitlement. Both Kootznoowoo, Inc. and Sealaska Corporation still have remaining entitlement.

Alternative D will result in timber harvest adjacent to lands selected by Sealaska Corporation and Kootznoowoo, Inc. (but not conveyed) within VCU 241. This selection boundary is not surveyed and caution is required to avoid inadvertent timber harvesting within this selection.

Alternative D will utilize LTFs at Corner Bay, Crab Bay, Inbetween Creek, and Oly Creek. Facilities at Corner Bay and Crab Bay are currently authorized and constructed. Inbetween Creek would require a DOA Corps Engineers permit and EPA NPDES permit to reactivate the site. Oly Creek would require authorization from Alaska State DNR, the COE, and EPA.

Alternative E

Alternative E will utilize LTFs at Corner Bay, Crab Bay, Inbetween Creek, and Oly Creek. Facilities at Corner Bay and Crab Bay are currently authorized and constructed. Inbetween Creek would require a DOA Corps Engineers permit and EPA NPDES permit to reactivate the site. Oly Creek would require authorization from Alaska State DNR, the COE, and EPA.

Alternative F

Alternative F will also result in the construction of logging roads within lands selected (but not conveyed) by both Sealaska Corporation and Kootznoowoo, Inc., within VCU 241. These lands are within a long-term timber sale contingency area. Section 908 of ANILCA provides that these lands may not be entered by the timber contractor nor the timber cut, except by agreement with the Native corporations, so long as the corporations have remaining entitlement. Both Kootznoowoo, Inc. and Sealaska Corporation still have remaining entitlement.

Alternative F will result in timber harvest adjacent to lands selected by Sealaska Corporation and Kootznoowoo, Inc. (but not conveyed) within VCU 241. This selection boundary is not surveyed, and caution is required to avoid inadvertent timber harvesting within this selection.

Alternative F will utilize LTFs at Corner Bay, Crab Bay, False Island, Inbetween Creek, and Oly Creek. Facilities at Corner Bay, Crab Bay, and False Island are currently authorized and constructed. Inbetween Creek would require a COE permit and EPA NPDES permit to reactivate the site. Oly Creek would require authorization from Alaska State DNR, the COE, and EPA.

Comparison of Alternatives

Alternatives C, D, and F would likely result in the greatest impacts to private land interests because these alternatives would result in both road construction and timber harvest in VCU 241, where Kootznoowoo, Inc. and Sealaska Corporation currently have land selections, and it would harvest timber in VCU 241, adjacent to these land selections.

Alternatives B and E would result in the least impacts to private land interests because these alternatives does not directly conflict with any known private lands or interests in private lands.

Alternative G has a greater potential to impact private land interests than Alternative F, because Alternative G would construct more road through Kootznoowoo and Sealaska Corporation selections in VCU 241, and it would harvest timber in VCU 241, adjacent to these selections.

Other Environmental Considerations

Probable Adverse Environmental Effects that Cannot be Avoided

Implementation of any action alternative may result in some adverse environmental effects that cannot be effectively mitigated or avoided if the proposed action is to take place. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen the significant adverse consequences. In addition, the application of standards and guidelines, BMPs, mitigation measures, and a monitoring plan are intended to further limit the extent, severity, and duration of these effects. The specific environmental effects of the alternatives were discussed earlier in this chapter, and the proposed mitigation measures are discussed for each alternative in Chapter 2. Although the formulation of the alternatives included avoidance of potentially adverse environmental effects, some adverse impacts to the environment which cannot be completely mitigated may occur.

Some adverse effects are of a transitory type. For example, air quality may diminish on a recurring, though temporary, basis due to the road construction, timber harvest, timber hauling, and recreation traffic on untreated roads, and due to the operation of internal combustion engines. These activities may have localized temporary adverse affects on air quality where these activities occur.

Although standards and guidelines, BMPs, and monitoring plans are designed to prevent significant adverse effects to soil and water, the potential for adverse impacts does exist. Sediment production would occur as long as roads are being built and timber is harvested. Sediment would be produced by surface erosion, channel erosion, and mass movement.

Disturbance, displacement, or loss of fish and wildlife may occur as a consequence of habitat loss and increased human activity in Project Areas. New road construction and the human activities associated with new access to areas previously unroaded will result in impacts to fish and wildlife. Improved access into areas that previously had limited roads would have similar effects. The proposed activities will likely increase competition for subsistence resources.

Ground-disturbing activities would temporarily increase sediment loads in some streams. This could displace fish, reduce anadromous and resident fish reproductive success, and alter aquatic invertebrate populations. In addition, a loss of fish habitat would occur at road crossings of streams. The portion of a stream bed occupied by a culvert or other structures would be lost as fish habitat.

Both the amount and distribution of mature and old-growth stands would be reduced through implementation of any action alternative. The rate and severity of adverse impacts varies by alternative. Because some wildlife species rely on habitat conditions provided by old-growth stands, the reduction in the populations of some wildlife species can be expected. As old-growth and mature timber stands are converted to young even-aged stands, the capability of the Project Areas to provide optimal habitat for old-growth dependent species would be reduced.

Timber harvest and road construction in areas that are currently unroaded will alter natural characteristics of these areas. This will modify the recreational experiences that are offered by these areas. Both Primitive and Semiprimitive recreational opportunities will be lost by these actions. In addition, these development activities will result in a loss of opportunity to consider these areas in future revisions of the Forest Plan, for designation as wilderness, as research natural areas, or for other purposes requiring natural characteristics.

The impacts of road construction on the natural characteristics of the area are unavoidable.

The natural landscape will appear visually altered by timber harvest, particularly where logging activity is highly visible from travel routes. These adverse effects will eventually be reduced by growth of vegetation. Other impacts on the natural appearance of the landscape include roads and structures which are highly visible despite efforts to blend them with land forms and mitigate the effect by landscaping.

The intensity and duration of these effects depends on the alternative and the mitigation measures applied to protect the resources. Most unavoidable effects are expected to be short term (usually less than 2 years). In all cases, the effects would be managed to comply with established legal limits, such as a maximum time for regeneration. To check and reduce these effects, monitoring procedures and mitigation measures have been planned for those areas which may be affected. Certain monitoring procedures and mitigation measures are required by existing standards or guidelines. Specific mitigation measures for each alternative are included in Chapter 2.

All alternatives would come under the mandate of the Multiple Use and Sustained Yield Act of 1969, which requires the Forest Service to manage National Forest lands for multiple uses (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grow again if the productivity of the land is not impaired.

Maintaining the productivity of the land is a complex, long-term objective. All alternatives protect the long-term productivity of the Project Area through the use of specific standards and guidelines, mitigative measures, and BMPs. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities will have direct, indirect, and cumulative effects on the economic, social, and biological environment.

Soil and water are two key factors in ecosystem productivity, and these resources will be protected in all alternatives to avoid damage which could take many decades to rectify. Sustained yield of timber, wildlife habitat, and other renewable resources all rely on maintaining long-term soil productivity. Quality and quantity of water from the Project Area may fluctuate as a result of short-term uses, but no long-term effects to the water resource are expected to occur as a result of timber management activities.

Relationship Between Short-term Uses and Long-term Productivity

All alternatives would provide the fish and wildlife habitat necessary to maintain viable, well-distributed populations of existing native and desired non-Native vertebrate species throughout the Project Area. The abundance and diversity of wildlife species depends on the quality, quantity, and distribution of habitat, whether used for breeding, feeding, or resting. MISs are used to represent the habitat requirements of all fish and wildlife species found in the Project Area. By managing habitats and populations of indicator species, the other species associated with the same habitat would also benefit. The alternatives provide standards, guidelines, and mitigation measures for maintaining long-term habitat and species productivity. The alternatives vary in the risk presented to both wildlife habitat and habitat capability.

Timber rotations are normally over 100 years. To ensure adequate production of timber, harvest has been scheduled to allow the earliest cut stands to mature into merchantable timber before the planned harvest of original stands is complete. When the first rotation is complete, mature timber stands would be harvested again on a new rotation. Management of the timber resource on these rotations could affect long-term productivity, depending on the intensity of silvicultural practices. Projected timber rotation lengths are not anticipated to affect long-term productivity. Mitigation measures are planned under all the alternatives to ensure future availability of other renewable resources as well.

Opportunities for dispersed recreation use, including hiking, camping, fishing, hunting, and viewing the natural scenery will be maintained and increased for future generations. The setting in which these activities occurs varies by alternative, but the long-term potential for the Project Area to provide a spectrum of recreation opportunities would be maintained in all alternatives.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are decisions to use, modify, or otherwise affect nonrenewable resources such as cultural resources or minerals. It could also apply to resources renewable only over a long period of time such as soil productivity or old-growth forests. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense or the resource has been destroyed or removed. All alternatives result in some irreversible commitments, although the extent and potential for adverse effects increase in alternatives which emphasize resource extraction and utilization.

Irretrievable commitments represent opportunities foregone for the period of the proposed actions, during which other resource utilization cannot be realized. These decisions are reversible, but the utilization opportunities foregone are irretrievable. Under multiple-use management, some irretrievable commitments of resources are unavoidable due to the mutually exclusive relationship between some resources. An example of such a commitment is development of logging camps and LTFs that will be removed at the completion of logging activities. These developments occupy approximately 3 to 5 acres and include bunkhouses, mobile homes, fuel storage facilities, etc. For the 3 to 5 years that such developments exist, the opportunity to otherwise utilize these areas is foregone, thus irretrievable.

The irreversible disturbance of some types of cultural resources may occur as a consequence of management activities. This would be especially true for subsurface resources that cannot be located through surface surveys. Even with mitigation, unanticipated or unavoidable disturbances can result in the loss of cultural values. Mitigation efforts such as data recovery involve the scientific and controlled destruction of a cultural resource site. Once undertaken, the effects are irreversible and the mitigation effort becomes an irretrievable commitment to the resource.

The use of energy resources and the removal of mineral resources are irreversible commitments of resources. The utilization of rock resources for road and facility construction would be an example. The use of fossil fuels during project administration activities would be an irreversible resource commitment. Alternatives vary by the amount of energy and mineral resources used; the No-Action Alternative abstains from the use of these nonrenewable resources at this time.

In unroaded areas, development activities such as timber harvest and the road construction associated with harvest will irreversibly reduce the potential amount of area that could be designated as a part of the National Wilderness Preservation System, managed as a Research Natural Area, or managed for other purposes requiring natural characteristics.

An irreversible loss occurs when forests of old-growth trees are harvested, fragmented, or removed for the construction of roads or other purposes. Old-growth stands provide key wildlife habitat and are also valued for ecological and aesthetic reasons. Because old-growth stands take more than 200 years to develop, the commitment of this resource to certain uses is reversible over a long period of time.

Some long-term uses of the land cause an irreversible loss of soil productivity. Examples of these uses include the establishment of arterial and collector roads and log-transfer facilities.

Possible Conflicts with Plans and Policies of Other Jurisdictions

The regulations for implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are the CZMA, Section 810 of ANILCA, and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law, as amended, requires Federal agencies conducting activities or undertaking development which affect the coastal zone to ensure that the activities or developments are consistent with approved State coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistence for activities within the coastal zone.

The Forest Service works closely with State and local governments to ensure that coastal management requirements are met.

The Alaska Coastal Management Program (ACMP), in turn, encouraged local coastal communities to develop local policies that guide the development of coastal resources. The City and Borough of Sitka participates in the program and has established the Sitka Coastal Management Citizens Committee, of which the Forest Service is a member. The City and Borough has also developed the Sitka District Coastal Management Program, which has as its goal "...to achieve wise use of the land and water resources of the coastal area and to balance economic growth with ecological and cultural values, so as to maintain and protect Sitka's coastal resources for the beneficial use and enjoyment for present and future generations." The Southeast Chichagof Project Area lies entirely within the boundary of the Sitka District Coastal Management Program.

Forest Service requirements for consistency are detailed in a Memorandum of Understanding between the State of Alaska and the Regional Forester, dated October 8, 1981. Standards against which the consistency evaluation will take place are: Alaska Statute Title 46, Water, Air, Energy, and Environment Conservation; Alaska Forest Practices Act of 1990; and the Sitka District Coastal Management Program.

The Forest Service has evaluated the preferred alternative to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs to the maximum extent practicable. The results of that evaluation are:

> Review of the comments enclosed in the City and Burough of Sitka's response to the Southeast Chichagof Draft EIS indicates that the Sitka Coastal Management District finds that, while there were several concerns identified, the proposed harvest activities are consistent with the Sitka District Coastal Management Program. In addition, the standards and guidelines for timber management activities in the Southeast Chichagof Project Area meet or exceed those indicated in the Alaska Forest Practices Act and the Alaska Coastal Management Program.

Evaluation of the proposed activities against standards and requirements for activities within the coastal zone, results in a finding that these activities are consistent with the Alaska Coastal Management Program to the greatest extent practicable. In accordance with the Memorandum of Understanding and Alaska Statutes, the Office of Governmental Coordination will do a consistence review of the preferred alternative, and will concur or object to this determination (Fox 1992).

Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action may significantly restrict subsistence opportunities. Refer to the *Subsistence* section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

State of Alaska's Forest Practices Act of 1990

On May 11, 1990, Governor Cowper approved the legislature's major revision of the State's Forest Practices Act (FPA). The revised act significantly increases the State's role in providing protection and management for important forest resources on State and private lands. The revised Forest Practices Act will also affect National Forest management through its relationship to the ACMP and the Federal CZMA (see above discussion).

For National Forest timber operations, such as proposed for the Southeast Chichagof Project, the effect of the revised Forest Practices Act is essentially two-fold. First, it clarifies that the revised Forest Practices Act is the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency, to the maximum extent practicable, with the Alaska Coastal Zone Management Program. Secondly, it calls for minimum 100-foot buffers on all Class I streams, and it recognizes that consistence to the maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber harvest activities, using specific methodologies which may differ from those required by the revised Forest Practices Act or its implementing regulations.

The TTRA prohibited commercial timber harvesting within buffer zones established on all Class I streams and those Class II streams which flow directly into a Class I stream. Buffer zones have a minimum width of 100-feet slope distance from the edge of either side of the stream. In addition, the Forest Service is currently working with the Alaska State Division of Government Coordination on a revision of the MOU between the State and the Forest Service. This revised MOU will establish the policies and procedures for coordinating State review of Forest Service programs and activities, including those covered by the Forest Practices Act and the Alaska Coastal Management Program.

The Forest Service will evaluate the preferred alternative prior to completion of the Final EIS and the ROD to ensure that the activities and developments specifically covered by the Forest Practices Act are consistent with its provisions to the maximum extent practicable.

Energy Requirements and Conservation Potential of Alternatives

The implementation of the proposed actions in the Southeast Chichagof Project Area will require the expenditure of energy (e.g., fuel consumption). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed or reconstructed. The direct effect of the alternatives on energy requirements would be attributed to

timber harvest, roaded construction and reconstruction, and travel necessary to administer the timber sale. Indirect energy requirements include processing wood products and the transport of the products to secondary processors and consumers. The estimated total fuel consumption required for each alternative is displayed in Table 4-97.

Table 4-97
Estimated Fuel Consumption (millions of gallons)

	Alternative					
	A1/A2	B	C	D	E	F
Preparation and Administration (1.56 gallons/MBF)	0	0.18	0.14	0.17	0.16	0.13
Logging and Transportation (14.8 gallons/MBF)	0	1.68	1.36	1.62	1.54	1.28
Road Construction and Maintenance (4,000 gallons/mile)	0	0.44	0.26	0.40	0.36	0.31
Total Consumption	0	2.30	1.76	2.19	2.06	1.72

SOURCE: Kosak and Allio 1992.

Note: The estimated fuel consumption for timber harvest activities is based on consumption per MBF of sawlog volume. Sawlog volume is estimated to be 79 percent of the total volume harvested.

Natural or Depletable Resource Requirements and Conservation Potential of Alternatives

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Laws Act of May 1872 and the Mineral Leasing Act of February 1920, is shared with the Bureau of Land Management (BLM). The demand for access to National Forest lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that will increase opportunities for access to the National Forest within the Southeast Chichagof Project Area. This increased access may result in increased activity with regard to both known and potential mineral or energy resource occurrences.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

The Southeast Chichagof Project Area contains no urban areas or built-up area of any kind. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. There are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management Program. Cultural resources and the proposed project design are discussed in the *Cultural* section of this chapter.

Effects of Alternatives on Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have the potential to produce some form of impact, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of this potential impact is required by Forest Service Manual and Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions as proposed for the Southeast Chichagof Project, the civil rights impact analysis is an integral part of the procedures and variables associated with the social impact analysis. This analysis is discussed in this chapter, in the section on *the Economic and Social Environment.*

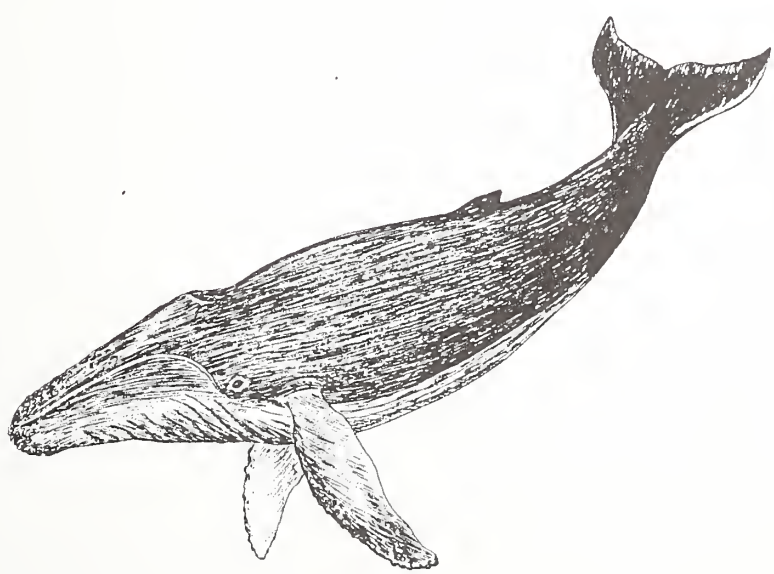
The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout the chapter as an integral part of the analysis of the effects on other components of the environment.

Effects of Alternatives on Prime Farm Land, Rangeland, and Forest Land

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The Project Area does not contain any prime farm lands or rangelands. Prime forest land does not apply to lands within the National Forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

Effects of Alternatives on Threatened and Endangered Species, and Critical Habitat

There will be no adverse impacts to any Federally listed threatened and/or endangered species or critical habitat as a result of this project. The humpback whale and the Stellar sea lion are the two known threatened and/or endangered species that inhabit the Project Area. The discussion of the effects of the alternatives on threatened and/or endangered species is presented in this chapter.



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Other Relevant Employment:
Forest Ranger Trainee, Florida Division of Forestry (1 1/2 years)

Loeffler, Gary M., Landscape Architect

B.S., Biological Sciences, Oregon State University, 1965
B.L.A., Landscape Architecture, University of Oregon, 1968
M.R.P., Regional Planning/Landscape Architecture, University of Pennsylvania, 1971

Forest Service: 20 years
Landscape Architect

Virginia Lutz, GIS Technician

B.A., Biology, Southwest State University, Minnesota, 1982

Forest Service: 2 1/2 years
Computer Clerk, Tongass NF, Chatham Area (22 months)
GIS Technician, Tongass NF, Chatham Area (7 months)

Domenick J. Monaco, Landscape Architect

B.S., Landscape Architecture, Pennsylvania State University, 1972

Forest Service: 11 years
Landscape Architect, Tongass NF, Chatham Area (11 years)

Other Employment:
Landscape Architect, U.S. Army Corps of Engineers (2 years)
Landscape Architect, GWSM, Inc., Pittsburgh, PA (7 years)

John B. Morrell, Lands Forester

B.S., University of Montana, 1967
M.S., Forestry, California State University, Humboldt, 1976
Master of Forest Resources, Outdoor Recreation Emphasis, University Of Washington

Forest Service: 15 years
Lands Forester, Tongass NF, Chatham Area (4 years)
Resource Assistant, Tongass NF, Ketchikan Area, Thorne Bay RD (2 years)
Resource Assistant, Tongass NF, Ketchikan Area, North Prince of Wales RD (1 1/2 years)
Forester/Recreation Assistant, Packwood RD (3 1/2 years)
Research Assistant, Pacific Northwest Experimental Station, Seattle

Kathleen Morse, Economics

B.S., Natural Resource Economics, Montana State University
Graduate Study, Coastal Zone Management, University of Washington

Forest Service/Private Industry: 4 years

Mary Beth Nelson, Recreation Planner

B.S., Recreation Area Management, Montana State University, 1979

Forest Service: 10 years
Recreation Planner, Tongass NF, Chatham Area (4 years)
Architectural Technician, Tongass NF, Chatham Area (4 years)
Architectural Technician, Kootenai NF (2 years)

Steve Paustian, Hydrologist, Interdisciplinary Team Member

B.S., Watershed Management, Colorado State University, 1974
M.S., Forest Hydrology, Oregon State University, 1977

Forest Service: 16 years
Forest Hydrologist, Tongass NF, Chatham Area (14 years)
Forest Hydrologist, Big Horn NF (2 years)

Other Relevant Employment:
Research Assistant, Forest Hydrology, Oregon State University (2 years)

Kathy Peterson, Transportation Planner

B.A., History, Washington State University, 1971

Forest Service: 14 years
Transportation Planner, Tongass NF, Chatham Area (5 years)
Civil Engineer Technician, Okanogan NF (9 years)

James Russell, Silviculturist

B.S., Forestry, University of Minnesota, 1970

Forest Service: 21 years
Forest/Silviculturist, Tongass NF, Chatham Area (6 years)
Forester, Regional Office, Milwaukee, WI (2 years)
Forester, Chippewa NF, Cass Lake, MN (7 years)
Forester, Tongass NF, Stikine Area, Petersburg, AK (6 years)

John C. Sherrod, Process Review and Oversight

B.S., Forestry, University of Georgia, 1960
M.S., Forest Resources, University of Idaho, 1980

Forest Service: 30 years
Planning Staff Officer, Helena NF, Chugach NF, and Tongass NF (14 years)
Planning Team Leader, Custer NF, Gallatin NF, Willamette NF (6 years)
Ranger District assignments on four Districts on the Collville NF and Custer NF (10 years)

Victor J. Starostka, Fisheries Biologist

B.S., Biology, University of Wisconsin-Stevens Point, 1967
M.S., Wildlife Biology, South Dakota State University, 1969

Forest Service: 15 years
- Area Fisheries Biologist, Tongass NF, Chatham Area (5 years)
- Forest Fisheries Biologist, Umpqua NF (6 years)
- Zone Fisheries Biologist, Dixie, Fishlake, Manit-Sal NF's (2 years)

Other Relevant Employment:
- Project Leader, Flaming Gorge Reservoir Investigations, Utah (5 years)
- Fisheries Biologist, Glen Canyon Reservoir Investigations, Utah (2 years)
- Fisheries Biologist, North Central Reservoir Investigations, NMFS (2 years)

Karen Swanson-Iwamoto, Archeologist

B.A., Anthropology, Oregon State University, 1979
B.A., History, Oregon State University, 1979

Forest Service: 11 years
- Archeologist, Tongass NF, Chatham Area (10 years)
- Archeology Technician, Malhuer NF (1 year)

Other Relevant Employment:
- Archeology Technician, Burley District, BLM (1 year)
- Independent Contractor, Archeology, Pacific NW and SE (2 years)

James M. Thomas, Forester and Operations Research Analyst

B.A., Biology, University of Colorado, 1974
Civil/Chemical Engineering, University of Colorado, 1969-1972
Geology, Western State College, Colorado, 1978-1979
Forestry/Natural Resource Planning, Colorado State University, 1980-1981

Forest Service: 14 years
- Forester, Planning Team, Tongass NF, Chatham Area, Sitka RD (3 years)
- Information Systems Group Leader, Tongass NF, Chatham Area (3 years)
- Information Systems Group Leader, Arapaho and Roosevelt NF (2 years)
- Operations Research Analyst, Shawnee NF (2 years)
- Natural Resource Planner, White River NF (1 year)
- Forestry Technician, Arapaho and Roosevelt NF (2 seasons)
- Wilderness Planner, San Juan and Rio Grande NF (1 year)
- Wilderness Planner, White River NF, Holy Cross RD (1 year)

Randolph A. West, Soils Scientist

B.S., English, Miami University, 1974
M.S., Pedology, Ohio State University, 1979

Forest Service: 11 years
Forest Service Soil Scientist, Tongass NF,Chatham Area (4 years)
Ecologist, Tongass NF, Ketchikan Area (2 years)
Soil Scientist, Rio Grande NF (6 months)
Soil Scientist, Shoshone NF (6 months)
Soil Scientist, Tongass NF, Chatham Area (4 years)

Other Relevant Employment:
Research Assistant, Agronomy Department, Ohio State University (3 years)
Soils Laboratory Technician, Agronomy Department, Ohio State University (1 1/2 years)

Temporary/Seasonal Employees

Laurie Cooper, Forest Technician

A.A., Forestry, Columbia College, Columbia, GA. 1979

Forest Service: Temporary positions (4 years)
Engineer Technician (3 years)
Forest Technician (1 year)

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Alaska F&G Advisory Committee, Upper Lynn Canal
Alaska F&G Advisory Committee, Wrangell
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Alaska Native Brotherhood, Camp #10
Alaska Native Brotherhood, Camp #7
Alaska Native Brotherhood, Grand Camp
Alaska Native Sisterhood, Camp #10
Alaska Native Sisterhood, Camp #4
Alaska Native Sisterhood, Camp #7
Alaska Native Sisterhood, Camp #76
Alaska Native Sisterhood, Grand Camp
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Brownies Charters
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City of Hoonah
City of Pelican
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False Island-Kook Lake Council
Field Construction
Glacier Guides, Inc.
Hames Corporation
Heritage North
Hidden Falls Hatchery c/o NSRAA
High Country News
KFSK Radio
Landau Associates Inc.
Marine Adventure Sailing Tours
N.C. Machinery
Northern Credit Services
Petersburg Chamber of Commerce
Petersburg Pilot
SE Alaska Seiners Association
Sealaska Corporation
Sierra Club
Sitka Daily Sentinel
Sitka News Bureau

Sitka Tribe of Alaska
Sitka's Secrets
Southeast Conference
Tlingit-Haida Central Council
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U.S. Coast Guard, Sitka Air Station
USDA Soil Conseration Service, State Conservationist
USDI National Park Service, Sitka National Historical Park
Wildlife Alaska Society
Wildlife Conservation Fund
Wrangell Chamber of Commerce
Wrangell Forest Productions Ltd.

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AK Dept. of Environmental Conservation, Public Information Office
AK Dept. of Environmental Conservation, SE Regional Office
AK Dept. of Environmental Conservation, Sitka District Office
AK Dept. of Fish & Game, Division of Commercial Fisheries
AK Dept. of Fish & Game, Division of FRED
AK Dept. of Fish & Game, Division of Habitat
AK Dept. of Fish & Game, Division of Sport Fish
AK Dept. of Fish & Game, Division of Subsistence
AK Dept. of Fish & Game, Division of Wildlife Conservation
AK Dept. of Fish & Game, Office of the Commissioner
AK Dept. of Fish & Game, Sitka Office, Division of Habitat
AK Dept. of Fish & Game, Sitka Office, Division of Sport Fish
AK Dept. of Fish & Game, Sitka Office, Division of Wildlife Conservation
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AK Dept. of Natural Resources, Division of Land
AK Dept. of Natural Resources, Division of Parks & Outdoor Recreation
AK Dept. of Natural Resources, Division of Water
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AK Dept. of Natural Resources, State Historic Presevation Officer
AK Office of Management & Budget, Division of Govermental Coordination
Alaska Forest Association
Alaska Land Use Council
Alaska Miners Association
Alaska Pulp Corporation
American Rivers
Baidarka Boats
Beyond Boundaries Expeditions
Chatham Cannery, Ltd.
City & Borough of Sitka
City of Angoon
City of Tenakee Springs
City of Wrangell
Ebasco Environmental
Federal Energy Regulatory Commission
Friends of the Earth
Greenpeace
Impact Assessment, Inc.
KCAW-Raven Radio
Kettleson Memorial Library
Kootznoowoo, Inc.
Logger's Legal Defense Fund
Lynn Canal Conservation, Inc.
Robertson, Monagle & Eastaugh
SE Alaska Regional Health Corp.
SE Native Subsistence Commission

SE Alaska Conservation Council
Sealaska Corporation
Shaffer & Harrington
Sheldon Jackson College, Stratton Library
Sierra Club Legal Defense Fund
Silver Bay Logging
Sitka Chamber of Commerce
Sitka Conservation Society
Soderburg Logging & Construction
Southeast Marine
Territorial Sportsmen, Inc.
The Boat Co., Ltd.
University of Alaska Anchorage, Institute of Social and Economic Research
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U.S. Army Corps of Engineers
U.S. Department of Commerce, NOAA, Ecology & Conservation Division
U.S. Department of Commerce, NOAA, National Marine Fisheries Service
U.S. Department of Interior, Office of Environmental Affairs
U.S. Environmental Protection Agency, Region X
U.S. Environmental Protection Agency, Office of Environmental Review
U.S. Fish and WildlifeService
USDA Soil Conservation Service
W. R. Tonsgard Logging
Whitstone Logging Co.
World Wildlife Fund.

Glossary

Glossary

Acronyms used in text

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
AMS	Analysis of the Management Situation, Tongass National Forest Land and Resource Management Plan Revision
ANCSA	Alaska Native Claims Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
APC	Alaska Pulp Corporation
ASQ	Allowable Sale Quantity
ATTF	Alaska Timber Task Force
ATV	All-terrain Vehicle
BLM	Bureau of Land Management
BMP	Best Management Practice
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
COE	Army Corps of Engineers
CZMA	Coastal Zone Management Act of 1976
DBH	Diameter at Breast Height
DEIS	Draft Kelp Bay Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Kelp Bay Environmental Impact Statement
FPA	Forest Practices Act
FSH	Forest Service Handbook
FTE	Full-time Equivalent
GIS	Geographic Information System
GMU	Game Management Unit
IDT	Interdisciplinary Team
IPASS	Interactive Policy Analysis Simulation System
KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
M	Modification
MA	Management Area

MBF	One thousand board feet
MIS	Management Indicator Species
MM	Maximum Modification
MMBF	One million board feet
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act of 1969 (as amended)
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
ORV	Off Road Vehicle
P	Preservation
PR	Partial Retention
PRIM	Primitive
R	Retention
RM	Roaded Modified
RMO	Road Management Objective
RN	Roaded Natural
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROT	Remain-open Temporary
RVD	Recreation Visitor Day
SHPO	State Historic Preservation Officer
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
TDS	Total Dissolved Solids
TIS	Transportation Inventory System
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
VCU	Value Comparison Unit
VQL	Visual Quality Level
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Terms used in text

Alaska Lumber and Pulp Corporation
Now named Alaska Pulp Corporation (APC).

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. In section 705(a) Congress directed that at least $40,000,000 be made available annually to the Tongass Timber Supply Fund to maintain the timber supply from the Tongass National Forest at a rate of 4.5 billion board feet per decade. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)
Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alaska Pulp Corporation (APC)
Previously Alaska Lumber and Pulp Corporation.

All-terrain Vehicle (ATV)
A wheeled vehicle less than 40 inches wide.

Allowable Sale Quantity (ASQ)
ASQ refers to the maximum quantity of timber that may be sold each decade from the Tongass National Forest. This quantity expressed as a board foot measure is calculated per timber utilization standards specified in the Alaska Regional Guide, the number and type of acres available for timber management, and the intensity of timber management. The ASQ was calculated at 4.5 billion board feet per decade for the Tongass National Forest.

Alpine/Subalpine Habitat
The region found on a mountain peak above 1,500-foot elevation.

Anadromous Fish
Anadromous fish spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish include pink, chum, coho, sockeye, and king salmon, and steel head trout. There are also anadromous Dolly Varden Char.

Analysis Area
An analysis area is a planning unit made up of two or more management areas identified in the Tongass Land Management Plan. This grouping of management areas is consistent with the area analysis direction found in the 1985-86 Tongass Land Management Plan Amendment.

Appraisal
See Timber Appraisal.

Aquatic Habitat Management Unit (AHMU)
A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

Class I AHMU: Streams with anadromous or high quality sport fish habitat. Also included is the habitat upstream from a migration barrier known to have reasonable enhancement opportunities for anadromous fish.

Class II AHMU: Streams with resident fish populations and generally steep (6 to I 5 percent) gradient (can also include streams from 0 to 6 percent gradient where no

anadromous fish occur). These populations have limited sport fisheries values and are separate from the high quality sport fishing systems included in Class I. They generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III AHMU: Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Arterial Road
A forest road that provides service to large land areas and usually connects with other arterial roads or public highways.

Beach Fringe Habitat
Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres.

Benthic Habitat
Refers to the substrate and organisms on the bottom of marine environments.

Best Management Practice
A practice or combination of practices that, after problem assessment, examination of alternative practices, and appropriate public participation is determined by a state to be the most effective and practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. A BMP is not a site-specific prescription but an action-initiating mechanism which eventually leads to the interdisciplinary development of a site-specific prescription.

Buffer
Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet of uncut timber in width on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a buffer.

Candidate Species
Those species of plant or animal which are under consideration (by US Fish and Wildlife Service and National Marine Fisheries Service) for listing as threatened or endangered but which are provided no statutory protection under Endangered Species Act.

Cant
A log partly or wholly cut and destined for further processing.

Category 2 Species
One of three categories of Candidate Species. Category 2 are those for which there is information indicating the species might qualify for endangered or threatened status.

Clearcut
A method of regeneration cutting in which the old crop is completely cut in designated patches. Regeneration in the Alaska Region is usually natural; and the size of the clearcut area rarely exceeds 100 acres.

Collector Road
A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to forest local roads or terminal facilities. Collector roads are usually long term facilities.

Commercial Fishery
Fish shellfish or other fishery resources taken or possessed within a designated area for commercial purposes.

Commercial Forest Land (CFL)
Productive forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

> Standard CFL: Timber that can be economically harvested with locally available logging systems such as highlead or short-span skyline.
> Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or longspan skyline.

Continuous Use Sites
LTF and camp sites where use of log transfer is expected to be continuous on a regular basis for 20 years or longer. These sites were described and analyzed by Sedlak in his analysis of alternative log transportation systems. Volume of expected timber is approximately 20 to 50 MMBF per year. Industry practice is to try to operate at a minimum 35-MMBF activity level if a year-round camp is to be maintained. Log sorting and scaling commonly occurs at these sites. Export shipping is expected for privately owned timber. This operation can be described as having two sides (two full yarding and support systems) with year-round land based camp operations normal. Sites originally developed and operated as continuous use will frequently change to intermittent use or occasional use sites subsequent to the initial timber harvest activities.

Conveyance
The passing of the title of a property from one owner to another.

Cruise
Refers to the general activity as opposed to a specific method of determining timber volume and quality.

Cultural Resources
Historic or prehistoric objects, sites, buildings, structures, and so on that result from past human activities.

Cumulative Effects
Cumulative effects are the impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Direct Employment
The jobs that are immediately associated with the Long-Term Contract timber sale including for example logging sawmills and pulp mills.

Dispersed Recreation
Recreational activities that are not confined to a specific place.

Draft Environmental Impact Statement
Section 102 of the National Environmental Policy Act (NEPA) requires that a statement of environmental effects for a major Federal action be released to the public and other agencies for comment and review prior to a final management decision.

Endangered Species
A species of plant or animal which is in danger of extinction throughout all or a significant portion of its range.

Estuary Fringe Habitat
A 1,000-foot zone around an estuary.

Estuary
For the purpose of this EIS process estuary refers to the relatively flat intertidal and upland areas generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-Aged Management
The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Clearcutting is an example of this type of management.

Existing Visual Condition (EVC)
The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:

Type I: These areas appear to be untouched by human activities.

Type II: Areas in which changes in the landscape are not noticed by the average person unless pointed out.

Type III Areas in which changes in the landscape are noticed by the average person but they do not attract attention. The natural appearance of the landscape still remains dominant.

Type IV: Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. Although the change in landscape is noticeable it may resemble a natural disturbance.

Type V: Areas in which changes in the landscape are obvious to the average person These changes appear to be major disturbances.

Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be drastic disturbances.

Fish Habitat
The aquatic environment and the immediately surrounding terrestrial environment that combined afford the necessary physical and biological support systems required by fish species during various life stages.

Floodplain
The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of offshore islands; including at a minimum that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

Forbes
Any herb that is not a grass or is not grasslike.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)
Amended in 1976 by the National Forest Management Act.

Forested Habitat
All areas with forest cover. Used in this EIS to represent a general habitat zone.

Geographic Information System (GIS)
GIS is an information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision making process. It is a system of computer maps with corresponding site specific information that can be electronically combined to provide reports and maps.

Habitat Capability
The number of healthy animals that a habitat can sustain.

Incidental Use Sites
LTF and camp sites where use of log transfer is expected to occur only once or twice over a 60 to 100 year period. Timber volumes at a site will normally not exceed 5 to 10 MMBF. Log sorting areas are normally not constructed and native log structures are expected. Typically the focus is on salvage of logs as a result of blowdown, disease, or harvest of isolated stands of timber. The lands involved are generally not accessible by alternative means. Floating camp operations are the norm.

Indirect Employment
The jobs in service industries that are associated with the Long-Term Contract timber sale including for example suppliers of logging and milling equipment.

Interdisciplinary Team (IDT)
A group of people with different backgrounds assembled to solve a problem or perform a task.

Intermittent Use Sites
LTF and camp sites where use is expected to vary from O to 17 MMBF per year. This operation can be described as having a "single side" (one full yarding and supporting system). These sites were described and analyzed by Sedlak in his analysis of alternative log transportation systems. Typically these sites will vary in use in a pattern of 4 MMBF for the first year, 11 to 17 MMBF for three years, 4 MMBF for the final year and a 6 to 15 year period with no log transfer. Timber volume from intermittent use would be at the average annual rate of about 3 to 5 MMBF per year over a 20 to 50 year period. Timber salvage operations may occur in the periods between major operations. Sort yards are not normally constructed if water storage sites are available. Year-round camp operation is generally not expected. Land-based camps have been common in the past, but increased use of floating camps has been observed at these sites.

Knutsen-Vandenberg Act (KV)
This Act was passed by Congress in 1930 and amended in 1976 to provide for reforestation, resource protection, and improvement projects in timber sale areas. These funds are collected as a portion of the stumpage fee paid by the purchaser. Examples of such projects are stream bank stabilization, fish passage structures, and wildlife habitat improvement.

Land Use Designation (LUD)
The method of classifying land uses presented in the Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define along with a set of coordinating policies a compatible combination of management activities. The following is a description of the four classifications:

LUD I: Wilderness areas.

LUD II These lands are to be managed in a roadless state in order to retain their wildland character, but this designation would permit wildlife and fish habitat improvement as well as primitive recreation facility and road development under special authorization.

LUD III: These lands may be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands provide opportunities for intensive resource use and development where the emphasis is primarily on commodity or market resources.

Large Woody Debris (LWD)
Any large piece of relatively stable woody material having a least diameter of greater than 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Layout
Planning and mapping (using aerial photos) of harvest and road systems needed for total harvest of a given area.

Local Road
A forest road that connects terminal facilities with forest collector, forest arterial or public highways. Usually forest local roads are single purpose transportation facilities and can either be long or short term in nature.

Log Transfer Facility (LTF)
A facility that is used for transferring commercially harvested logs to and from a vessel or log raft or the formation of a log raft. It is wholly or partially constructed in waters of the United States and siting and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed terminal transfer facility.

Long-term Road
Roads developed and operated to provide either continuous or intermittent access for long-term land management and resource utilization needs.

Management Area
An area one or more VCUs in size for which management direction was written in the Tongass Land Management Plan.

Management Indicator Species (MIS)
The following categories were used where appropriate: endangered and threatened plant and animal species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; nongame species of special interest; additional plant or animal selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.

Mitigation
These measures include avoiding an impact by not taking a certain action or part of an action, minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during he life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

National Environmental Policy Act (NEPA)
Passed by Congress in 1969, NEPA declared a national policy to encourage productive harmony between humans and their environment to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality. This act requires the preparation of environmental impact statements for federal actions that are determined to be of major significance.

National Forest Management Act (NFMA)
A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

Nonforest Land
Land that has never supported forests and lands formerly forested but now developed for nonforest uses or land with less than 10 percent cover of commercial tree species.

Notice of Intent (NOI)
Notice of Intent was submitted to indicate an intention to produce this EIS on March 1, 1990.

Occasional Use Sites
LTF and camp sites where intensive log transfer is expected for only 4 to 6 years out of a 20-to-30-year period. These sites have not been analyzed in the literature. The use pattern is expected to be cyclical through the life of the site. Timber volumes from major activities would be at the average annual rate of 1 to 2 MMBF per year over a 20 to 50 year period. Small timber operations will occur during the periods when major sale activities do not occur. Sort yards are constructed only if no other options are available. Floating camp operations are the expected normal situation unless commuting of workers from an established camp is feasible.

Operating Area
Areas within APC contract boundary area where the Forest Service designates units and roads in which timber may be cut or built to meet contract commitment.

Old-Growth Forest
Old-growth stands are characterized by trees well past the age of maturity (dominant trees exceed 300 years in age). Stands exhibit declining growth rates and signs of decadence such as dead and dying trees snags and downed woody material. Stands include trees of all ages, multilayered canopies, a range of tree diameter sizes (including very large diameter trees up to and exceeding 3 meters), and the notable presence of understory vegetation. Old growth stands are defined in the TLMP inventory as those stands having the majority of timber volume in trees more than 150 years of age.

Operating Plan
Five-year plan for logging, road construction, and related activities under Federal Government contract with the APC.

Overstory
In a stand with several vegetative layers the overstory is the uppermost layer usually formed by the tallest trees.

Pole/Young Sawtimber Stage
The stage following timber harvest when canopy closure decreases the amount of ligh. .hat reaches the forest floor and is associated with a rapid reduction in understory biomass. Usually 26 to 150 years.

Pond Value
The selling value of timber without the manufacturing cost.

Potential Yield
The potential yield for the next ten years is the maximum harvest that is possible given the optimum perpetual sustained-yield harvesting level attainable with intensive forestry on regulated areas and considering productivity of the land, conventional logging technology, standard silvicultural treatments, and relationships with other resource uses and the environment.

Practicable
This term means the LTF is available and capable of being constructed after taking into consideration costs, existing technology, and logistics in light of overall project purposes (40 CFR 230.3(q)). Such an analysis of LTF sites would include consideration of the intensity of site use, duration of site use, and the physical and biological characteristics of the site.

Precommercial Thinning
The practice of removing some of the trees of less than marketable size from a stand in order to achieve various management objectives.

Probability Zone

Recreation Opportunity Spectrum (ROS)
The system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skill needed to enjoy the area, and the relative density of recreation use. The classes are:

> Primitive: An essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use is generally not permitted.
>
> Semi-Primitive Nonmotorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Use of local roads for recreational purposes is not allowed.
>
> Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Local roads used for other resource management activities may be present.
>
> Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.
>
> Roaded Modified: A natural environment that has been substantially modified particularly by vegetation manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Rural: A natural environment that has been substantially modified by development of structures and vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Recreation Places
Identified geographic areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Recreation Sites
Specific locations used for recreational activities such as a specific anchorage, campsite or trail. There may be one or more recreation sites within a recreation place.

Resident Fish
Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

Riparian
Areas immediately adjacent to a body of water the vegetation of which is usually influenced by the water.

Road Management Objective (RMO)
Defines the intended purpose of an individual road based on Management Area direction and access management objectives. Road management objectives contain design criteria, operation criteria and maintenance criteria. Long-term and short-term roads have RMOs.

Road Prism
The area taken out of production from the top of the cut or toe of the fill on one side of a road to the top of the cut or toe of the fill on the other side of the road.

Roads, Specified
A road including related transportation facilities and appurtenances shown on the Sale Area Map and listed in the Timber Sale Contract.

Roads, Temporary
For National Forest timber sales temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent forest transportation network and have stream crossing structures removed erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Second-Growth Forest
Even-aged stands that will grow back on a site after removal of the previous timber stand.

Seedling/Sapling Stage
The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually 1 to 25 years.

Sensitivity Level
The measure of people's concern for the scenic quality of the National Forests. In 1980 the Tongass National Forest assigned sensitivity levels to land areas viewed from boat routes and anchorages plane routes, roads trails, public use areas, and recreation cabins.

Level 1: Includes all seen areas from primary travel routes use areas and water bodies where at least three-fourths of the forest visitors have a major concern for scenic quality .

Level 2: includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the forest visitors have a major concern for scenic quality.

Level 3: Includes all seen areas from secondary travel routes, use areas, and water bodies where less than one-fourth of the forest visitors have a major concern for scenic quality .

Silviculture
Forest management practices that deal with the establishment, development, reproduction, and care of forest trees.

Short-Term Road
Roads developed and operated for a limited time period but which are likely to be extended during a future entry and which cease to exist as a transportation facility after the purpose for which they were constructed is completed. These roads are considered part of the Forest transportation network.

Slash
Debris left over after a logging operation i.e. limbs, bark, broken pieces of logs.

State Historic Preservation Officer (SHPO)
State appointed official who administers Federal and State programs for cultural resources.

Subsistence Use
The term subsistence use means the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing, for personal or family consumption; and for customary trade.

Successional Stage
One stage in a series of changes affecting the development of a biotic community. On its path to a climax stage the community will pass through several stages of adaptation to environmental changes.

Tentatively Suitable Forest Land
Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Thousand Board Foot Measure
A method of timber measurement in which the unit is equivalent to 1000 square feet of lumber one inch thick. It can be abbreviated Mbd Mbm or MBF.

Threatened Species
A species of plant or animal which is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range.

Timber Appraisal
Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Entry
A term used to refer to how far into the timber rotation an area is on the basis of acreage harvested. For example, if an area is being managed for 3 entries over a 100-year rotation, the first entry would be completed when one-third (approximately 33 percent) of the available acreage is harvested (usually in 30-40 years); the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60-70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Timber Sale Contract
Refers to the APC Long-Term Timber Sale Contract in the Supplemental EIS. The Timber Sale Contract is between the Alaska Pulp Corporation and the Forest Service and is informally referred to by many as the 50-year Contract.

Tongass Land Management Plan (TLMP)
The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning and the daily uses and activities carried out within the forest. See also Land Use Designation.

Tongass Resource Use Cooperative Survey (TRUCS)
A compilation of data on subsistence uses for evaluating the effects of the Forest Service's action contemplated in the revision of the regional Tongass Land Management Plan.

Turbidity
A measure of suspended sediments.

Understory
Anything growing in a stratum definitely below the main crown canopy.

Understory-Colonization Stage
The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually 1 to 25 years.

Uneven-Aged Management
The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Group and individual tree selection are examples of this type of management.

Value Comparison Unit (VCU)
These areas which generally encompass a drainage basin were established in the Tongass National Forest to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Visual Quality Level (VQL)
VQLs are the level of visual quality that would result from the implementation of each alternative, expressed in the same terms as the VQOs, e.g., Retention, Partial Retention, Modification, Maximum Modification.

Visual Quality Objective (VQO)
Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

> Preservation:
> Permits ecological changes only. Applies to wilderness areas and other special classified areas.
>
> Retention:
> Provides for management activities that are not visually evident; requires reduction of contrast through mitigation measures either during or immediately after operation.
>
> Partial Retention:
> Management activities remain visually subordinate to the natural landscape. Mitigation measures should be accomplished within one year of project completion.
>
> Modification:
> Management activities may visually dominate the characteristics landscape. However activities must borrow from naturally established form line color and texture so that its visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.
>
> Maximum Modification:
> Management activities may dominate the landscape. Mitigation measures should be accomplished with five years of project completion.

Volume
Stand volume based on standing net board feet per acre by Scribner Rule.

Volume Class
Volume class strata are used to describe the average volume of timber per acre in thousands of board feet (MBF). Following are the volume class strata and the range of volume each contains.

> Volume Class Strata 3: Less than 8 MBF/acre (cleared land seedlings or pole timber stands).
>
> Volume Class Strata 4: 8 to 20 MBF/acre.
>
> Volume Class Strata 5: 20 to 30 MBF/acre.
>
> Volume Class Strata 6: 30 to 50 MBF/acre.
>
> Volume Class Strata 7: 50+ MBF/acre.

V-notch
A V-shaped stream channel generally on steep mountainous terrain.

Watershed
The drainage area of a stream.

Wetland
Those areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wilderness
An area established by the Federal Government and administered either by the Forest Service National Park Service Fish and Wildlife Service or Bureau of Land Management in order to conserve its primeval character and influence for public enjoyment under primitive conditions in perpetuity.

Wildlife Analysis Area (WAA)
Alaska Department of Fish and Game administrative designation of and area that includes one or several Value Comparison Units (VCUs) for the purpose of regulating wildlife populations and reporting harvests.

Wildlife Habitat
The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Windthrows
Areas where trees are uprooted, blown down, or broken off by storm winds.

Spelling of Tlingit Clan Names in this Environmental Impact Statement

The spelling of Tlingit Clan names in this Environmental Impact Statement is based on two sources. The first is the current standard alphabet devised by Constance Naish and Gillian Story in the 1960s and was revised by Jeff Leer and Nora Marks Florendo Dauenhauer in 1972 with the consent of Ms. Naish and Ms. Story. This is the same alphabet that is used in the Tlingit Verb Dictionary (Story and Naish 1973), the Tlingit Noun Dictionary (Story and Naish 1976), the Tlingit Spelling Book (Dauenhauer and Dauenhauer 1984), and in all school programs in Alaska. This spelling is used in the text of this EIS.

The second source is Alaska Department of Fish and Game, Division of Subsistence technical papers on the harvest and use of fish and wildlife by residents of various Southeast Alaska communities. ADF&G utilized various historical standards for spelling on maps showing historic Tlingit Clan hunting boundaries. These maps are reproduced in the Chapter 3, *Subsistence*.

The following gives current standard spelling for specific Tlingit clan names and the ADF&G spelling for each map showing historic Tlingit clan hunting boundaries.

	Current Standard	ADF&G
Angoon Clans	Aanxaakitaan	Anqakitan
	Deisheetaan	Decitan
	Dakl'aweidi	Daklawedi
	Kak'weidl	Kaukwedi
	Teikweidi	Teokwedi
	Wooshkeetaan	Wuckitan
Hoonab Clans	Chookaneidi	Chukanei Dee´
	Takdeintaan	T'akdeintaan
	Wooshkeetaan	Woosh Ki Taan
Sitka Clans	Chookaneidi	Tcukanedi
	Kaagwaantaan	Kagwantan
	Kiks.adi	Kiks'adi
	L'uknax.adi	Luqnaxadi
	T'akdeintaan	Dak'dentan

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